
EXHIBIT 44

PETER ALEXANDER, Ph.D.

EDUCATION

Ph. D., Electrical Engineering, Massachusetts Institute of Technology, 1971

MS, Electrical Engineering, University of Illinois, 1967

BS, Electrical Engineering, University of Canterbury, New Zealand, 1965

PROFESSIONAL AFFILIATIONS & AWARDS

Fulbright Scholar, 1965

National Science Foundation – Small Business Innovation Research, 1988

Dept. of Energy – Small Business Innovation Research, 1988

Member Association of Computing Machinery (ACM)

Member IEEE Computer Society

PROFESSIONAL EXPERIENCE - SUMMARY

Technical Expertise - Computer software design, development & deployment

- Forensic data acquisition and analysis
- Microsoft Visual Studio component and application design
- Web integration of authentication services, streaming media services, ad displays, content feeds
- Implementation of real-time and media streaming systems
- Architecture and design of complex business systems involving database back ends
- Oracle 8i, 9i, SQL Server 2000, and DB2 database technology.
- Java, C, C++, Visual Basic, assembly language programming
- Embedded microprocessor designs
- Network equipment design and manufacture (LAN cards, routers, bridges)
- Security, authentication, networking, firewalls, hacking countermeasures, backups, archives and service level agreements for customer-outsourced data.

Domain Expertise - Client-server and web-based software applications

- ERP systems – financial, distribution, manufacturing, SF automation applications (Platinum Software)
- eCommerce - Secure web transactions, authentication (InfrastructureWorld.com, Syntricity, Inc.)
- Semiconductor manufacturing – yield analysis, semiconductor defect analysis (Syntricity, Inc.)

Peter Alexander, Ph.D.**Resume****Page 2.****LITIGATION RELATED EXPERIENCE**

- **Patent Litigation.** Contributions made to numerous patent infringement cases, three of which required participation in claim construction for Markman hearings, including courtroom assistance to attorneys during claim construction. Authored three infringement and three validity rebuttal reports in support of plaintiffs, as well as numerous non-infringement and invalidity reports on behalf of defendants. Testified in deposition as an expert in patent cases regarding claim construction, infringement and invalidity.
- **Software contract disputes.** Analysis of desktop, Internet, and client-server software projects to determine adherence to industry-standard software development processes, and to evaluate architectural design decisions. Contributions made to numerous cases, including court testimony in two, and deposition testimony in four others.
- **Forensic analysis.** Provided forensic analysis of Internet and computer hard drive technology to recover deleted computer data and determine algorithms. Performed analysis of peer-to-peer file sharing servers for government agencies.

Jury Testimony**WhitServe LLC, v. Computer Packages, Inc.****US District Court, Southern District of Connecticut.**

Civil Action No. 3:06CV01935 (AVC)

Matter: Patent infringement - web document services.

Technical Issues: Analysis of MS Access VBA, ASP, .NET code and web technology.

Responsibilities: Prepare non-infringement and invalidity reports on behalf of defendant Computer Packages, Inc. Testified in deposition regarding invalidity and non-infringement reports, Sept. 2007. Testified in jury trial May, 2010 regarding invalidity and non-infringement.

Law Firm: Fitzpatrick, Cella, Harper & Scinto, New York, for defendant CPI.

Opposing counsel: St. Onge Steward Johnson & Reens, CT

Data Treasury Corporation v. Wells Fargo, The Clearing House Payments Co., et al.**U.S. District Court, Eastern District of Texas, Marshall Division**

Civil Action No. Civil Action No. 2:06-CV-72 (Hon. David Folsom)

Matter: eCommerce patent litigation.

Technical Issues: eCommerce software; data encryption and authentication technology including IPSec, PGP, SSL, key exchange and Message Authentication Codes; TCP/IP networking.

Responsibilities: Invalidity report, non-infringement report. Deposition testimony December, 2009. Testified in jury trial on behalf of defendant. The Clearing House March 24, 2010 regarding non-infringement.

Law Firm: Fitzpatrick, Cella, Harper & Scinto, New York, and Sullivan & Cromwell LLP for defendant Clearing House Payments.

Opposing counsel: Ostrow Kaufman Frankl, New York, Ward & Smith, TX, Nix Patterson Roach, TX.

Disposition: Work completed March 2010. The Court ruled in favor of The Clearing House regarding the post trial motions as to non-infringement

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and joint liability with Viewpointe. The jury found joint infringement for US Bank and The Clearing House as joint defendants, which was upheld by the Court.

epicRealm Licensing, LLC (Parallel Networks) v. Autoflex Leasing, Franklin Covey, Clark Consulting, Herbalife of America, Various Inc.

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action Nos. 5:07-CV-125, 5:07-CV-126, 5:07-CV-135 (Hon. David Folsom)

Matter: Web technology patent litigation.

Technical Issues: Web site implementation

Responsibilities: Retained by Franklin Covey, Co., Clark Consulting, Inc., Herbalife of America, Various, Inc. Researched specific non-infringement issues; wrote declaration on support of motion to dismiss, and testified in deposition Dec., 2007 regarding that declaration. Testified in deposition regarding non-infringement by Herbalife (June 2008) and Various Inc., (July 2008).

Testified in jury trial on behalf of defendant FriendFinder in the jury trial Parallel Networks v. Various, FriendFinder August 20, 2008 regarding non-infringement and non-infringing alternatives.

Disposition: Work completed November, 2008.

Law Firms: Vedder Price, Chicago, IL; Jones Day, New York, NY; Pepper Hamilton, Boston, MA, Fenwick & West, San Francisco, for defendants.

Opposing counsel: Baker Botts.

Dell USA, LP v. Lucent Technologies, Inc

US District Court, Eastern District of Texas, Sherman Division

Civil Action No. C.A. 4:03-cv-347. (Hon. Richard A. Schell.)

Matter: Patent infringement - configurator applications for manufacturing.

Technical Issues: Analysis of configurator algorithms, software automation.

Responsibilities: Invalidity and non-infringement report on behalf of defendant Lucent Technologies. Testified in deposition regarding non-infringement and invalidity, Sept. 2007. Testified in jury trial on Jan. 29-30, 2008 regarding non-infringement and invalidity.

Disposition: Jury returned a verdict in favor of Lucent Technologies for non-infringement.

Law Firm: Kirkland & Ellis, LLP, New York, NY, for defendant.

Opposing counsel: Haynes & Boone, Dallas, TX.

Orion IP LLC v. Mercedes-Benz USA et al

US District Court, Eastern District of Texas, Tyler Division.

Civil Action No. 6:05-cv-322 (Hon. Leonard Davis)

Matter: Patent Infringement – automated proposal generation.

Technical Issues: Technology and analysis for web sites.

Responsibilities: Wrote non-infringement report regarding Hyundai Motor America web sites. Testified in deposition regarding non-infringement report. Testified in jury trial, May 24, 2007 regarding non-infringement, primarily for the '342 patent.

Disposition: For the contested '342 patent the jury found in favor of Hyundai Motor Corporation for non-infringement.

Law Firm: Jackson Walker L.L.P., Dallas, TX for defendant

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Opposing counsel: Williams, Morgan & Amerson, P.C., and Wong, Cabello, Lutsch, Rutherford & Brucculeri, LLP, Houston, TX.

Amer Jneid et al v. Novell Inc., Tripole Corporation

Superior Court of State of California, County of Orange

Civil Action No. 02CC00182 (Hon. David C. Velasquez)

Matter: Breach of contract.

Technical Issues: Networking technology code analysis

Responsibilities: Analysis of source code for Novell product implementations.

Testified at deposition on behalf of defendant Tripole Corp.

Testified in Jury trial, November 2006.

Disposition: Completed work November, 2006. Jury awarded \$13.5M damages to client Tripole Corporation. The jury ruled against licensee Novell Corp. As the IP licensor, Tripole Corporation was awarded approximately \$13.5M damages.

Law Firm: Waldron & Olson, Newport Beach, CA, for Tripole Corp.

Opposing counsel: Workman Nydegger, UT.

CyberNET Engineering v. Con-Way Transportation

Circuit Court of the State of Oregon, for the County of Multnomah

Case No. 0107-07220, April 7-8, 2003

Matter: Contract dispute.

Technical issues: Local area network design and implementation for 300 service centers.

Responsibilities: Researched relevant networking issues and testified at jury trial on behalf of plaintiff.

Law Firm: Martin Bischoff Templeton Langslet, Portland, OR, for plaintiff

Disposition: Jury verdict in favor of plaintiff. 2003.

International Trade Commission testimony:

Microsoft Corp. v. Motorola, Inc.

United States International Trade Commission, Washington, DC.

Investigation No. 337-TA-744 (Hon. Theodore R. Essex)

Matter: Mobile phone operating system and database technology.

Technical Issues: Android OS software implementation for Motorola Droid mobile telephones. Implementation of notification and telephony subsystems. Analysis of contact management database.

Responsibilities: Research infringement issues, review source code for Motorola Droid phone implementations. Wrote non-infringement rebuttal and invalidity reports for three patents. Testified in deposition June, 2011. Provided direct testimony Witness Statement at ITC Hearing Aug. 22, 2011. Microsoft counsel declined to cross examine.

Disposition: Completed activities in Aug. 2011.

Law Firm: Quinn Emanuel, New York, for defendant.

Opposing counsel: Sidley Austin, Washington DC.

Nokia Corporation v. Apple, Inc.

United States International Trade Commission, Washington, DC.

Investigation No. 337-TA-701 (Hon. E.J. Gildea)

Matter: Mobile phone and music player software technology.

Technical Issues: Software implementation for Apple iPhone, iPad and iMac telephony, camera architecture and user interface functionality.

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Responsibilities: Research infringement issues, review source code for iPhone. Wrote infringement and validity rebuttal reports for two patents and infringement report for camera architecture patent. Testified in deposition Oct. 5-6, 2010. Testified in ITC Hearing Dec. 1-2, 2010.

Disposition: Completed work in December 2010. Settlement reached June 2011.

Law Firm: Alston-Bird, Washington DC, for Complainant Nokia Corp.

Opposing counsel: Wilmer Hale, Palo Alto, CA.

Pioneer Electronics (USA), Inc. v. Garmin Corporation**United States International Trade Commission, Washington, DC.**

Investigation No. 337-TA-694 (Hon. C.C. Charneski)

Matter: Computerized navigation using GPS.

Technical Issues: Source code analysis for Garmin GPS navigation devices.

Responsibilities: Research non-infringement issues, review source code. Wrote infringement reports for three patents. Testified in deposition regarding infringement in June, 2010. Testified in open court hearing Sept. 16-17, 2010 regarding infringement and claim construction.

Disposition: Completed work in Sept. 2010.

Law Firm: Finnegan Henderson Farabow Garrett & Dunner, Washington DC, for Complainant Pioneer.

Opposing counsel: Adduci, Mastriani & Schaumbert LLP, Washington DC.

Honeywell International Inc. v. Pioneer Corporation, Pioneer Electronics et al.**United States International Trade Commission, Washington, DC.**

Investigation No. 337-TA-657 (Hon. Theodore R. Essex)

Matter: Computerized navigation using GPS and inertial systems.

Technical Issues: Source code for GPS signal processing.

Responsibilities: Research non-infringement issues, review source code. Wrote Non-infringement reports for two patents. Testified in deposition April, 2009 and June 10, 2009. Testified in open court hearing June 11, 2009 regarding non-infringement of '132 and '286 patents by Pioneer Corp.

Disposition: Work completed June 2009. The Court ruled for non-infringement for both the '132 and '286 patents.

Law Firm: Finnegan Henderson Farabow Garrett & Dunner, DC, for Respondent Pioneer.

Opposing counsel: Robbins, Kaplan, Miller, Ciresi, Los Angeles.

Markman Hearing testimony:**Finisar Corporation v. XM Satellite Radio, Inc. & Sirius Satellite Radio, Inc.****US District Court, Eastern District of Texas, Lufkin Division.**

Civil Action No. No. 9:07-CV-99 (Clark) (Hon. Ron Clark)

Matter: Patent litigation concerning satellite content distribution.

Technical Issues: Indexing of data, scheduled data delivery via satellite

Responsibilities: Research claim construction issues. Testified briefly in claim. construction hearing, February, 2008.

Disposition: Work completed 2008.

Law Firm: Kilpatrick Stockton for plaintiff.

Opposing counsel: Fish & Richardson, Washington, DC, and Kramer Levin Naftalis & Frankel, New York.

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Auction Management Solutions Inc. v. Manheim Auctions Inc. et al

U.S. District Court, Northern District of Georgia, Atlanta Division

Civil Action No. 05-CV-0639 (RWS) (Hon. Richard W. Story)

Matter: Online auction technology patent litigation.

Technical Issues: Communications protocols and streaming media

Responsibilities: Research claim construction issues. Testified in deposition regarding claim construction in May, 2006. Provided a declaration to the Court regarding construction terms for the asserted patent claims. Testified in court during claim construction hearing, August, 2006. Wrote infringement report, validity report and testified in deposition May 2008 on behalf of AMS as plaintiff.

Disposition: Markman Order issued Oct. 2007. Defendant stipulated to non-infringement in cross suit. Inactive.

Law Firm: Finnegan Henderson Farabow Garrett & Dunner for plaintiff.

Opposing counsel: Ropes & Gray LLP, Morris Manning & Martin, Covington & Burling, Dow Lohnes & Albertson

McKesson Information Solutions v. Epic Systems Corp.

U.S. District Court, Northern District, Georgia, Atlanta Division

Civil Action No. 1:06-cv-2965 (Hon. Jack T. Camp)

Matter: Patent infringement - web-based services.

Technical Issues: Analysis of web technology.

Responsibilities: Assist in claim construction. Testified in deposition regarding contributions to claim construction, Sept. 2007. Provided assistance with technology tutorial entered into evidence at Markman Hearing, July 2, 2008. Testified in deposition regarding infringement, February, 2009.

Disposition: Motion For Summary Judgment regarding non-infringement in favor of defendant Epic Systems. Work completed March 2009.

Law Firm: Kilpatrick Stockton LLP, Atlanta, GA, for defendant Epic.

Opposing counsel: Womble Carlyle Sandridge & Rice PLLC, Charlotte, NC

Deposition Testimony

Eolas Technologies, Inc. v. Google, Inc.

U.S. District Court, Eastern District of Texas, Tyler Division

Civil Action No. 6:09-cv-00446-LED.

Matter: Multimedia Display In Web Browsers.

Technical Issues: Behavior of web browsers when displaying video and other multimedia content. Analysis of Google AJAX JavaScript implementation, YouTube web site video delivery, Chrome and Android browser technology, and browser plugin architecture.

Responsibilities: Wrote non-infringement report covering 34 different Google products including Android, Chrome, YouTube, Gmail, Search Suggest, Maps, Circles, Talk Plugin Video Accelerator, Documents, Presentation and Spreadsheets. Testified in deposition Jan. 6, 2012.

Disposition: The jury found the '906 and '985 patents to be invalid during the Invalidity phase of the trial. Work completed Feb. 2012.

Law Firms: Ropes & Gray, Palo Alto, CA, for defendant Google.

Opposing counsel: McKool Smith, TX.

Peter Alexander, Ph.D.**Resume****Page 7.****Augme/Modavox, Inc. v. Tacoda Inc., AOL .****U.S. District Court, Southern District of New York**

Civil Action No. 07-CV-7088 (CM)(CWG) Judge Colleen McMahon.

Matter: eCommerce patent litigation.

Technical Issues: Implementation of Internet browser and server technology.

Responsibilities: Research JavaScript and web page tracking non-infringement issues, assist with claim construction. Testified in support of Tacoda motion for summary judgment, April, 2011.

Disposition: Active.

Law Firm: Orrick, Herrington & Sutcliffe LLP, New York, for defendant.

Opposing counsel: Shaub & Williams LLP, LA, Goodwin Procter, New York.

Juxtacomm Technologies v. Ascential Software, Microsoft Corp., IBM Corporation**United States District Court, Eastern District Texas.**

Civil Action No. 2:07-CV-359 LED

Matter: Data Warehouse patent dispute.

Technical Issues: SOA software implementation, ETL database technology.

Responsibilities: Analyze IBM products in preparation for non-infringement report. Wrote invalidity comparison report regarding IBM's prior art data warehouse products. Wrote non-infringement report. Testified in deposition July, 2009 regarding non-infringement and prior art products.

Disposition: Case settled October 2009.

Law Firms: Fitzpatrick, Cella, Harper & Scinto, New York, Kirkland & Ellis, LLP, New York, NY, for defendant IBM.

Opposing counsel: Akin Gump Straus Hauer and Feld, LLP. Ward & Smith, TX.

Madison Tyler Holdings, LLC., et al v. Financial Asset Trading & Technology of California, LLC, et al.

JAMS Arbitration JAMS Ref. No. 1220038462 (Justice Richard Neal)

Matter: Misappropriation of Trade Secrets, financial market trading software.

Technical Issues: Examine code and algorithms in Java application re-write of market-maker trading functionality for similarity with original Python code base.

Responsibilities: Perform duties as a neutral, Court-appointed technical expert. Review Java and Python code bases for similarities. Perform automated and manual code comparisons. Wrote technical report on findings and testified in deposition June, 2009.

Disposition: Settled July 2009. Work completed July 2009.

Law Firms: LathamWatkins, Los Angeles, Storch Amini & Munves, PC, Paul, Weiss, Rifkind, Wharton & Garrison LLP, New York, Skadden Arps, Los Angeles, Bird, Marella, Boxer, Wolpert, Nessim, Century City, CA, Irell & Manella, Los Angeles.

Irise v. Axure Software Solutions, Inc., Integrated Electrical Services, Inc.**U.S. District Court, Central District of California, Western Division.**

Case No. 08-CV-03601 SJO (JWJx) Hon. S. James Otero.

Matter: Patent litigation regarding rapid software prototyping tools

Technical Issues: Microsoft .NET source code implementation analysis.

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Responsibilities: Research non-infringement issues, review source code. Wrote Invalidity and Non Infringement reports; testified in deposition June, 2009.

Disposition: Case settled Sept., 2009.

Law Firm: Orrick, Herrington & Sutcliffe, LLP, Irvine CA, for defendant Axure.

Opposing counsel: Knobbe, Martens, Olson & Bear, LLP.

Constellation IP, LLC v. Avis Budget Group, FedEx Corporation.

United States District Court, Eastern District of Texas, Texarkana Division.

Civil Action No. 5:07-cv-00038-DF-CMC

Matter: Patent infringement - computer based customized presentations.

Technical Issues: Analysis of FedEx web sites. Delivery of web pages to web browsers.

Responsibilities: Wrote non-infringement report. Testified in deposition regarding non-infringement, June, 2008.

Disposition: Settled. Work completed 2008.

Law Firm: Finnegan Henderson Farabow Garrett & Dunner, Reston, VA, for defendant FedEx.

Opposing counsel:

Sedona Corporation v. Open Solutions, Inc..

United States District Court, District of Connecticut.

Index No. 3:07CV171 (TPS)

Matter: Contract dispute regarding porting of source code from Java platform to Microsoft .NET platform.

Technical Issues: Java and C# source code analysis and comparisons for a large application concerned with data warehouses/data marts for the banking industry.

Responsibilities: Wrote expert report regarding similarities of code. Testified in deposition, September, 2008.

Disposition: Completed work September 2008.

Law Firm: Schiff Hardin LLP, San Francisco, CA for plaintiff Sedona Corporation.

Opposing counsel: Pullman & Comley, LLC, Bridgeport, CT.

Taurus IP, LLC v. DaimlerChrysler and Mercedes Benz USA, Inc.

United States District Court, Western District of Wisconsin

Civil Action No. 07-C-0158-C

Matter: Patent infringement - computer based management of data models used for managing sales information.

Technical Issues: Analysis of source code used to implement DaimlerChrysler and Mercedes Benz web sites.

Responsibilities: Wrote non-infringement report. Testified in deposition regarding non-infringement, Dec. 2007.

Disposition: Court awarded summary judgment of non-infringement and invalidity on 2 claims.

Law Firm: Kilpatrick Stockton LLP, Atlanta, GA, for defendants DaimlerChrysler & Mercedes Benz.

Opposing counsel: DeWitt, Ross and Stevens S.C., Madison, WI

Telematics Corporation v. UPS, Inc., et al

U.S. District Court, Northern District of Georgia, Atlanta Division

Civil Action Nos. 1:07-cv-0105-ODE

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Matter: Vehicle telematics technology patent litigation.
 Technical Issues: Computer implementation of GPS tracking system
 Responsibilities: Retained by Motorola, Ryder, and Verizon to address infringement allegations. Assist attorneys with claim construction issues; testified in deposition Jan., 2008 regarding claim construction.
 Disposition: Work completed 2007.
 Law Firms: Kilpatrick Stockton, Atlanta, GA, for defendant Motorola Inc., and Roylance, Abrams, Berdo & Goodman, LLP, Washington, DC for defendants Ryder Truck Rental, Teletrac, Inc.

Opposing counsel: Thomas, Kayden, Horstemeyer & Risley, LLP

NetRatings, Inc. v. WebSideStory, Inc

US District Court, Southern District of New York

Civil Action No. 06 Civ. 878 (LTS)(AJP)

Matter: Patent infringement - web user tracking.
 Technical Issues: Analysis of web sites, client application software, and browser characteristics.
 Responsibilities: Wrote invalidity report on behalf of defendant WebSideStory. Testified in deposition regarding invalidity report, May 2007.
 Disposition: Settled Aug., 2007.
 Law Firm: Latham Watkins, LLP, New York, NY, for defendant.
 Opposing counsel: Dreier, LLP, New York, NY.

Coupons Inc. v. Indian Harbor Insurance Company

American Arbitration Association

AAA Case No. 74 133 Y 91922 94 /DEAR

Matter: Patent insurance contract dispute.
 Technical Issues: Web server software implementation and patent infringement issues.
 Responsibilities: Testify on technical issues analyzed during E-Centives v. Coupons Inc. patent litigation while representing Coupons. Testified at deposition on behalf of plaintiff, May 2006.
 Disposition: Case settled, Aug. 2006.
 Law Firm: Farella Braun & Martel LLP, San Francisco, CA for plaintiff.
 Opposing counsel: Sonnenschein Nath & Rosenthal LLP, San Francisco, CA

Lending Tree LLC v. LowerMyBills, Inc.

**United States District Court, Western District of North Carolina
Charlotte Division**

Civil Action No. 3:05CV153-C

Matter: Patent Infringement – credit analysis.
 Technical Issues: Technology and code analysis for web sites
 Responsibilities: Wrote infringement and invalidity rebuttal reports. Testified in deposition regarding infringement, September 2006. Testified in deposition regarding Invalidity rebuttal report, November, 2006
 Disposition: Settled 2006.
 Law Firm: King & Spalding LLP, Atlanta, GA for plaintiff.

Sky Technologies LLC v. IBM Corp. and i2 Inc.

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2:03CV454-DF Judge David Folsom.

Matter: Supply-chain negotiation patent litigation.
 Technical Issues: Analysis of Java J2EE applications/ Enterprise Java Bean technology.

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Responsibilities: Conducted research concerning infringement position and claim construction. Testified in deposition regarding infringement and invalidity.

Law Firm: Townsend Townsend and Crew, San Francisco, and Susman Godfrey LLP, Houston, TX for plaintiff.

Opposing counsel: Fitzpatrick, Cella, Harper & Scinto

Disposition: Settled. Completed work in Jan. 2006.

Trilogy Software, Inc. v Selectica, Inc.

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2-04-CV-160 (TJW). Judge T. John Ward

Matter: Internet eCommerce patent litigation.

Technical Issues: Web server interaction with client browsers.

Responsibilities: Research non-infringement issues in cross complaint. Testified at deposition regarding Trilogy's proposed claim construction. Wrote expert declaration in support of claim construction, expert reports regarding invalidity and non-infringement.

Law Firm: McKool Smith, Dallas, TX for defendant in cross complaint.

Opposing counsel: Howrey Simon Arnold & White; Ireland Carroll and Kelley, PC., Jones & Jones; Brown McCarroll LLP.

Disposition: Settled. Completed work in Jan. 2006.

Inight Software, Inc. v. Verity, Inc.

United States District Court, Northern District of California, San Francisco.

Civil Action No. C 05-01660 CRB Judge Charles R. Breyer

Matter: Contract dispute regarding licensed software products.

Technical Issues: Software architecture.

Responsibilities: Research C++ and Java software architecture.
Wrote expert opinion on technical software implementation issues for large server-based linguistic analysis systems. Testified in deposition.

Disposition: Settled Feb. 2006.

Law Firm: Manatt, Phelps & Phillips, LLP, Palo Alto, for defendant.

Opposing counsel: Orrick, Herrington & Sutcliffe

Dongjin Semichem v. EmailFund

American Arbitration Association

AAA Case No. 50 T 168 0013403

Matter: Software development contract dispute.

Technical Issues: Elliptic Curve Cryptography for wireless handheld devices.
Encompasses Wireless Public Key Infrastructure, ECC algorithms, RSA algorithms, equivalence of Public Key and Symmetric Key encryption strengths, and WTLS.

Responsibilities: Wrote expert declaration. Conducted research on technical issues for plaintiff.

Disposition: Testified at deposition and at arbitration hearing on behalf of plaintiff.

Law Firm: Lee, Kim & Song Professional Law Corporation, Los Angeles, CA for plaintiff.

Opposing counsel: Sonnenschein Nath & Rosenthal LLP, Chicago, IL

Neoris de Mexico v. Ariba, Inc.

U.S. District Court, Northern District of CA, San Francisco Division.

Case No. C 02 1670 JSW

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Matter: Breach of warranty and contract.
Technical Issues: B2B marketplaces and exchange design and development
Responsibilities: Wrote expert opinion and testified at deposition on behalf of defendant.
Disposition: Settled Jan. 2006. Completed work April 2004.
Law Firm: Howard, Rice, Nemerovski, Canady, Falk & Rabkin, San Francisco, CA for defendant.

Opposing counsel: Legal Strategies Group

E-Centives v. Coupons, Inc.

U.S. District Court, District of Maryland, Northern Division

Civil Action No. RDB-02-CV3701

Matter: Web software patent infringement.
Technical Issues: Microsoft ASP web servers, user tracking and consumer web services.
Responsibilities: Conducted technical research on software implementation, wrote expert opinion regarding invalidity, wrote rebuttal opinion re non-infringement, and testified at deposition on behalf of defendant.
Disposition: Settled April 2005.
Law Firm: Foley & Lardner, Washington, DC for defendant
Rader, Fishman & Grauer, Washington, DC

Opposing counsel: Mintz, Levin, Cohn, Ferris, Glovsky and Popeo

Acacia Media Technologies Corp. v. New Destiny Internet Group

U.S. District Court, Central District of California, Southern Division

Case No. SA CV 02-1040 JW (MLGx)

Matter: Streaming multimedia systems patent litigation.
Technical Issues: Implementation of web-based multimedia encoding.
Responsibilities: Conducted research, created technology tutorial for Markman hearings; wrote an expert declaration on video compression technology. Testified in deposition.
Disposition: Completed work in Sept 2005.
Law Firm: Hennigan Bennett & Dorman, Los Angeles, CA for plaintiff.
Opposing counsel: Foley & Lardner, Fish & Richardson

Peninsular Technologies, LLC v. WinCan America

United States District Court, Western District of Michigan, Southern Division

Civil Action No. 1:04-CV-0305

Matter: Multimedia patent litigation.
Technical Issues: Characteristics of MPEG video for visual inspection systems.
Responsibilities: Wrote non-infringement expert report and contributed to claim construction. Testified in deposition regarding claim construction and non-infringement.
Disposition: Completed work October 2005.
Law Firm: Rader, Fishman & Grauer, Michigan for defendant.
Opposing counsel: Piuce, Heneveld, Cooper, DeWitt & Litton, LLP

MicroStrategy Incorporated v. Business Objects Americas, Crystal Decisions

United States District Court, for the District of Delaware.

Civil Action No. 03-1124-KAJ

Matter: Web server report automation patent litigation.
Technical Issues: Web server interaction with client browsers.

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Responsibilities: Analysis of source code to determine infringement issues. Wrote Infringement expert report and Validity rebuttal report. Contributed to claim construction. Testified in deposition regarding infringement and invalidity rebuttal.

Disposition: Completed work in October 2005.

Law Firm: Howrey Simon Arnold & White, Washington D.C. for plaintiff.

Opposing counsel: Townsend Townsend & Crew

Young Conaway Stargatt & Taylor LLP

Datamize Inc. v. Charles Schwab & Co., CyberTrader, Inc.

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2:03-CV-321 Judge David Folsom.

Matter: User interface patent infringement.

Technical Issues: Interpretation of software design and implementation for applications involving graphical user interfaces (GUI) allowing various degrees of built-in flexibility.

Responsibilities: Assisted lawyers with interpretation of patent specification, and contributed to claim construction terms as a computer expert. Testified in deposition as an expert witness regarding indefinite terms. Wrote tutorial and declaration in support of defendant's claim construction brief. Attended Markman Hearing and assisted attorneys with preparation.

Disposition: Settled. Completed work in Dec. 2004.

Law Firm: Orrick Herrington & Sutcliffe, New York, NY for defendant.

Opposing counsel: McKool Smith

Network Appliance v. BlueArc Corp.

U.S. District Court, Northern District of CA, San Francisco Division

Case No. C 03-05665 MHP Judge Marilyn Hall Patel

Matter: Network file sharing patent infringement.

Technical Issues: Interpretation of multiprocessor hardware/software architecture and implementation for a Network File System data storage patent. The technology involves multiprocessor operating systems, microprocessor hardware, Internet protocols, and inter-processor messaging.

Responsibilities: Advised lawyers on the interpretation of patent specifications, contributed to claim construction for "means plus function" structure definition, testified in claim construction deposition as an expert witness. Wrote declaration in support of defendant's claim construction brief; wrote rebuttal declaration in response to opposing expert report.

Disposition: Completed work in Dec. 2004.

Law Firm: Keker & Van Nest, San Francisco, CA and
Bromberg & Sunstein, Boston for defendant.

Opposing counsel: Howrey Simon Arnold & White

Business-To-Business Markets Inc. v. Kshema Tech. Ltd.

Superior Court of the State of California County of LA, Central District

Case No. BC280932, January 21, 2004

Matter: Breach of contract.

Technical Issues The software development contract involved a complex, Java-based exchange web site. Apache web server, Weblogic application server,

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Tomcat application web server, Oracle 8.1 database server, Java JSP pages, Java EJB deployment, Linux operating system.

Responsibilities: Wrote expert declaration and testified at deposition on behalf of defendant, Feb. 2004. Testified in second deposition, April 2007.

Disposition: Motion for summary judgment in favor of defendant.

Law Firm: Law Offices of Timothy Cronin, San Francisco, CA for defendant.

Carma Consulting v. FileNet Corp and Farmers Insurance

United States District Court, Central District of California

Case No. SACV02-115DOC (MLGX), July 16, 2003

Matter: Theft of trade secret case involving the alleged unauthorized release of source code.

Technical issues: Two Windows Active-X server components, written in Visual Basic were supplied to Farmers Insurance as a run time OCX and a DLL respectively. Evaluated the reproduction cost and the potential economic damages for disclosure of source code.

Responsibilities: Wrote expert opinion and testified at deposition on behalf of defendant.

Disposition: Motion for summary judgment in favor of defendant. 2003

Law Firm: Cummins & White, Newport Beach, CA for defendant.

Has also served as an expert during the last four years:

VirnetX v. Apple Inc., Cisco Systems, Inc., et al.,

U.S. District Court, Eastern District of Texas, Tyler Division

Civil Action No. 6:10-cv-417.

Matter: Virtual Private Networks using cryptographic methods.

Technical Issues: Internet telephony, Secure Sockets Layer, authentication and encryption techniques using Public Key, Digital Certificates, secure domain name services.

Responsibilities: Invalidity Report for Joint Defendant Group..

Disposition: Current.

Law Firms: Desmarais LLP, NY, Williams Morgan Amerson, Houston, TX.
for defendant Cisco Systems, Inc.

Opposing counsel: McKool Smith P.C., Dallas, TX.

Leon Stambler v. Amazon.com, Inc., et al.,

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2:09-cv-310.

Matter: Authentication of POS transactions using cryptographic methods.

Technical Issues: Point-of-Sale cryptography, Secure Sockets Layer, authentication and encryption techniques using Public Key, Digital Certificates, Smart Cards and Symmetric Key cryptography.

Responsibilities: Wrote invalidity report regarding the Stambler '302 and '148 patents and non-infringement report regarding Newegg web site implementation.

Disposition: Current.

Law Firms: Zarian, Midgley & Johnson PLLC, and Webb Law Firm, for defendant NewEgg, Inc.

Opposing counsel: Ward & Smith Law Firm, Longview, TX.

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Vasudevan Software, Inc., v. IBM Corporation.

U.S. District Court, Northern District of California, San Jose Division

Civil Action No. 5:09-Cv-05897.

Matter: Database integration for OLAP.

Technical Issues: Installation of database and OLAP analysis technology.
Implementation of MS SQL Server and IBM DB2 technology.

Responsibilities: Review technology issues.

Disposition: Current.

Law Firms: Kirkland & Ellis, NY, for defendant IBM.

Opposing counsel: Susman Godfrey LLP, Seattle, WA.

Leon Stambler v. J.P. Morgan Chase, First Tennessee

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2:08-CV-204.

Matter: Authentication of POS transactions using cryptographic methods.

Technical Issues: Point-of-Sale cryptography, Secure Sockets Layer, authentication and encryption techniques using Public Key, Digital Certificates, Smart Cards and Symmetric Key cryptography.

Responsibilities: Wrote invalidity report regarding the Stambler '302 and '148 patents.

Disposition: Case settled May, 2010.

Law Firms: Andrews Kurth, Dallas, TX, for defendants First Tennessee Bank and Compass Bank.

Opposing counsel: Ward & Smith Law Firm, Longview, TX.

Nomadix, Inc. v. Second Rule LLC.

US District Court, Central District of California, Western Div.

Civil Action No. - 2:2007cv01946

Matter: Patent infringement – transparent Internet connectivity.

Technical Issues: Analysis of Proxy ARP, HTTP proxy servers, TCP connectivity.

Responsibilities: Wrote invalidity report on behalf of defendant Second Rule.

Disposition: Completed work Dec., 2008.

Law Firm: Klehr Harrison Harvey Branzburg & Ellers, LLP, for defendant.

Opposing counsel: Knobbe Martens Olson & Bear, LLP, Irvine, CA.

WebSideStory, Inc v. NetRatings, Inc.

US District Court, Southern District of California, San Diego Div.

Civil Action No. 06cv408 WQH (AJB)

Matter: Patent infringement - web user tracking.

Technical Issues: Analysis of web sites and browser characteristics.

Responsibilities: Wrote infringement report on behalf of plaintiff WebSideStory

Disposition: Settled Aug., 2007.

Law Firm: Latham Watkins, LLP, San Diego, CA, for plaintiff.

Opposing counsel: Brown, Raysman, Millstein, Felder & Steiner, New York, NY.

Cogent Systems, Inc. v. Northrop Grumman Corporation

Superior Court of State of California

Los Angeles Superior Court, Central District

Civil Action No. BC332199

Matter: Breach of Contract, Misappropriation of Trade Secrets

Technical Issues: Technology and code analysis for automated fingerprint recognition.

Responsibilities: Analysis of source code and system architecture.

Disposition: Completed work April, 2007. Case settled September 2007.

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Law Firm: Parker Milliken Clark O'Hara Samuelian and Hennigan Bennett & Dorman for plaintiff.

Opposing counsel: Sheppard, Mullin, Richter & Hampton LLP

Automated Business Companies v. ENC Technology Corp. et al.

United States District Court, Southern District of Texas, Houston Division

Civil Action No. H-06-1032

Matter: Patent Infringement – remote login and access.

Technical Issues: Technology and code analysis for web sites

Responsibilities: Initial system analysis.

Law Firm: Fulbright and Jaworski for defendant LogMeIn, Inc. (formerly 3AM Labs Inc. for defendant.

Opposing counsel: Smyser Kaplan Veselka, LLP, and Dunlap Coddling & Rogers, P.C.

Rasterix Holdings LLC v. Research In Motion, Ltd., Arizan Corp.

Superior Court of Fulton County, State of Georgia

Civil Action No. 2003-CV-76785

Matter: Breach of Agreement, Misappropriation of Trade Secrets.

Technical Issues: Technology and code for document filters for hand-held devices.

Responsibilities: Source code analysis.

Law Firm: Howrey, Chicago, IL, for defendant.

Opposing counsel: Kilpatrick Stockton LLP, Atlanta, GA.

American Calcar Inc. v. BMW North America, LLC

United States District Court, Southern District of California.

Civil Action No. 04CV00614 DMS (LSP) Judge Dana M. Sabraw

Matter: User interface patent litigation.

Technical Issues: User interface characteristics, broadcast FM radio systems, GPS navigation.

Responsibilities: Research non-infringement issues. Wrote invalidity and non-infringement expert opinions for two patents.

Disposition: Defendant won non-infringement Motion for Summary Judgment Work completed Oct. 2005. Case settled.

Law Firm: Howrey Simon Arnold & White, Irvine, CA, for defendant.

Opposing counsel: Knobbe Martens Olson & Bear LLP

Orion IP, LLC. v. Home Depot USA Inc., Harley Davidson, Inc., Toyota Motor Sales, USA, Inc.

U.S. District Court, Eastern District of Texas, Marshall Division

Civil Action No. 2:04-CV-297 LED. Judge Leonard Davis

Matter: eCommerce patent litigation.

Technical Issues: Implementation of Internet browser technology.

Responsibilities: Research non-infringement issues

Disposition: Settled January 2006.

Law Firm: Vinson & Elkins, LLP, Houston, TX for defendant Harley Davidson.

Opposing counsel: Williams, Morgan & Amerson, Ireland Carroll and Kelley, PC

PROFESSIONAL EXPERIENCE**2003 to Present Independent Computer Consultant**

Independent computer technology consultant since February 2003, offering advisory services for information technology organizations, venture capital groups and the legal profession. Services have been provided for projects in the following areas:

- Computer software development contracts for Internet and client-server software implementation.
- Disaster recovery for large scale IT operations.
- Definition of product design and market positioning for a “distance learning” product designed to enable training of employees via a web server application.
- Forensic analysis of computer data and electronic discovery from computer disks.
- Definition of a web-based eCommerce system to provide secure business transactions. Developed architectural plans and database schema for Oracle database implementation.
- Provided technical consulting services regarding the behavior of certain scripts used for a mIRC chat server (Jedi 2.1). Analyzed the internal architecture of the Jedi relay chat system. At issue was the behavior of a Jedi server when a remote user (client) uploaded a file for distribution to other clients. Analyzed the upload scripts and formed a preliminary opinion regarding the functional behavior of the code.
- Provided research on spyware products that are downloaded to a user’s client computer while browsing the web. Determined the behavior and installation mechanisms for this class of spyware products, and provided consulting on ways of removing them.
- Provide consulting services to eBusiness clients for the creation of SOAP integration of database services. Provided planning assistance for a large, ASP (Active Server Pages) web site to implement live business information feeds.
- Analyzed web application server prototypes from Apache Software Foundation reference implementations such as the Apache HTTP server project, Jakarta Tomcat Project (J2EE Servlet and JSP Web container), Turbine a servlet based application framework, and the Velocity Template Engine reference designs

**2001 to 2003 Syntricity, Inc., San Diego, CA
Vice President Technical Operations**

Syntricity is a supplier of application software to the semiconductor industry. Its customers include Intel, Sun Microsystems, Broadcom, Qualcomm and Conexant. Products are installed on Unix and NT 4.0 web servers at the customer site as Intranet solutions (Enterprise), or on Unix servers at the Syntricity data center, which offers an ASP style subscription services.

Developed a large capacity warehouse architecture and deployable warehouse solution to support defect, FBM, lot history, non-lot equipment, and other data storage requirements to support analysis of yield and production forecasts from test data acquired in the

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semiconductor manufacturing environment. This system was built on Oracle 8i and 9i commercial RDBMS products. Implemented a comprehensive set of statistical analysis tools including multivariate regression and confidence level testing to facilitate yield trend and production scheduling for semiconductor manufacturers. Developed a messaging transaction system - "Integration Server" for WIP/MES back-end business processes. Various technologies were incorporated including: RMI, from a JMS input queue and JNDI for naming services.

The design was implemented with Oracle 9.2 loader and schema validation technology, and required user ETL data to be formatted as XML documents. Java 2 SE was the implementation platform language. The web server, based on the Tomcat open source code from the Apache Consortium, was enhanced to provide comprehensive access control according to user class, and included integrated end-user script-based customization (using the open source Python interpreter). XML objects were used extensively to represent web server data structures in the core implementation. High volume datalog insertion (ETL) back-end functionality was implemented for user uploads via FTP. An earlier generation C-coded CGI version was also supported. All products developed were web server solutions, with access via a standard browser. Responsible for creating and managing design teams as well as quality assurance, configuration management, technical hosting operations, and technical documentation groups. Responsible for product functional specifications, source code control, defect tracking, configuration/build management, and application validation.

Responsible for a team of 40 people across four groups that included software engineering, database design, quality assurance and technical operations. Java 2 was the implementation platform language, and Oracle 8.1.6 was used for the warehouse database. All products were designed as web server solutions, with access via a standard browser. Responsible for creating and managing design teams as well as quality assurance, configuration management, technical hosting operations and technical documentation groups. Detailed understanding of source code control, defect tracking, configuration management and build tracking.

Customers using the hosting subscription center run under contractual Service Level Agreements (SLA). The ASP hosted service is currently implemented on an E4800 Sun application server running Solaris 8, connected to an Oracle database server (Oracle 8.1.6). Storage totaling approximately 1 Terabyte is provided through a combination of the EMC Clarion System 1 storage arrays (Raid-5) accessed via fiber channel, and network attached storage using the Network Appliances NetApp devices. Veritas SANPoint Foundation Suite HA for Solaris is used as the storage management tool.

2000 to 2001

InfrastructureWorld, San Francisco, CA
Chief Technology Officer

Infrastructureworld, a spin off from Bechtel Enterprises, offered services through a collaborative web site for large-scale construction projects. Managed development staff of 10, and operational staff of 3 to create, enhance and maintain the live web site. Responsible for a new web server implementation based on NT4.0 and Windows 2000 technologies, to support authentication through certificates, user access control via

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authenticated account login, SSL extranet connections and document encryption. Investigated Public Key/Private Key encryption authentication mechanisms before selecting Windows NT integrated challenge/response authentication as the preferred authentication technique.

Each business client was hosted as a separate virtual web site with secure access to content that described the client's projects offered for bid. Functionality included insurance and financing RFP's, document management, and project collaboration. In addition, each web site offered integration of multimedia content for promotion of client projects, including steaming video and audio content. Implemented a secure data access system using native NT operating system authentication services. All documents and files were transmitted via 128-BIT SSL using server side certificates for server authentication to the client browser. Automatic virus scanning and cleaning was implemented for all documents and files uploaded by users to the web server. The operational web server site was implemented with a two-tier server configuration using Raid (redundant) storage.

1999 to 2000**CareerPath.com, Los Angeles, CA
Senior Vice President, Technology**

Management of Operations and Development teams. Lead the company's Web site re-architecture project, providing higher levels of Web server and Oracle database performance. Implementation of methodologies for project management, code review, quality assurance, and defect tracking. Managed the operations group (40) supporting the production Web site, encompassing wide area networking, Unix administration, Oracle DBA support, HTML authoring and quality assurance teams. Managed the software development staff (25) which created new technology infrastructure and dynamic page content using Java middle tier servlets, Java Beans, JSP presentation components, and Oracle technology. Object oriented programming techniques were applied through use case analysis.

Created a feed management system, written using server-side Java parsing technology, to processes Web job postings harvested from Web spider technology. Later enhancements included development of a Content Management system (using XML page representation), vertical affiliate co-branding system, transparent registration and login across a federation of partnership Web sites, and a comprehensive on-line reports server.

1999**Charles Schwab Online Trading, Phoenix, AZ
Independent Consultant**

This project involved disaster recovery cold site planning for the Charles Schwab Online Web Trading facility. The web capability was capable of handling 200,000+ concurrent users, and was implemented with 300 load-sharing IBM gateway servers working behind eight Cisco Catalyst 7500 routers. The traffic was distributed across the front line servers and routed to an ensemble of 200 middle tier servers, which manage the business objects and execute the trades. In the third tier, customer financial and demographic data was

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maintained on a group of seven IBM mainframes running DB2. A design was formulated that gives the Schwab organization a contingency backup system in the event of catastrophic failure of the main site.

**1997 to 1999 Platinum Software Corp., Irvine, CA
(Re-named as Epicor Software Corp)
Vice President, Development**

Reported to the President until 7/1/98, then reporting to the Executive VP of Product/Marketing. Member of the Executive Committee (top 8 executives in Platinum).

Managed a team of about 100 contributors working on Windows NT-based Client-Server systems. The Department was organized into five functional groups each headed by a Director-level manager, and includes ERP application development, technology/tools development, Windows/DOS legacy systems, QA and documentation teams.

This scope of the development effort encompassed the Platinum ERP client-server product suites, which include financial and distribution applications. These applications, based on Microsoft SQL Server technology, are implemented within a two-tier tool set, and involved 500 tables and more than 2000 stored procedures. Responsibilities also included all ERP integration tools and application content. The ERP integration suite allows remote transaction integration of customer relationship management, sales force automation, distribution, manufacturing, and financial applications, as well as OLAP business intelligence reporting via client-side components and Microsoft DSS.

Direct management of teams deploying MS Message Queue, MS Transaction Server, MS SQL Server 6.5 and 7.0, NT 4.0, XML, and business object technology. Successfully launched a high volume test group to establish performance of the client-server products under stress, and to determine their scalability. Built an architectural team to design and implement 3 tier, thin-client framework, using Java business objects running on an application server. Established effective methodologies for fostering cooperation in development projects requiring the participation of geographically remote design and development teams.

Developed a pure Java client-server system to support an end user form builder application. The objective of this project was to demonstrate an application server-centric 3-tier architecture. Application servers are dispensers of services, and a Java compilation service was the central technology being demonstrated. The pilot development showed building block to support a broad variety business object models, forms architectures, and rules engines. (JDK 1.1)

A full-functionality GUI in Java was also developed, along with a Java-based Customization Workbench, built, using the form class metaphor, which is familiar to users of Visual Café, JBuilder, or J++ 6.0. The Java Swing classes were used in the implementation.

Created a prototype OLAP decision support analysis system. The Platinum Info Report pack contained OLAP cubes specific to the Platinum ERA financial, distribution and

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manufacturing data. OLAP cubes were implemented on top of core Platinum applications to enable multi-dimensional analysis on key business drivers such as sales activity. Reports contained in the Info Report Pack were designed to leverage graphical, WYSIWYG reporting and analysis capabilities of Crystal Info, a third party reporting package, including: presentation-quality formatting, charts, graphs, drill-down, top "N" analysis, search, sort and criteria selection.

1994 to 1996**Quixote Corp., Chicago, IL****Vice President, Technology (Reporting to the President of Legal Technologies, Inc.)**

Legal Technologies, a subsidiary of the Quixote Corp., was formed as a consortium of four companies operating in the legal vertical market to address law office automation, and related legal services.

Formulated opinions and strategies for technology-related products being considered for acquisition or development by the company. Assisted the corporate legal counsel in the interpretation of patent claims for the purpose of defending or initiating lawsuits. Participated in negotiations with plaintiffs to bring about resolution of legal conflicts.

Managed teams developing Windows client-server database applications for the legal/judicial markets. These products involved MFC C++ and Visual Basic 4.0, NT/SQL Server and Btrieve technology.

Development of video deposition applications. Encoding of VHS tapes from video depositions into MPEG using Real Magic encoders. Annotation of video to allow rapid search of content and synchronization of video to the written transcript. The user was provided with the ability to jump to a specific page and line in the written transcript with automated tracking to the correct location in the displayed video. Similarly, the rolling video stream would automatically scroll the text display.

1989 to 1992**Fibronics International, Lowell, MA****General Manager, Spartacus subsidiary**

Successfully developed software products for TCP/IP and Unix-related networking applications. These products performed routing and bridging functions for Internet packets, at data rates of up to 100Mbps across FDDI fiber networks. Technology involved embedded C-coded Intel RISC CPU's and Motorola 68K series microprocessors. In addition, a suite of Internet-protocol software packages was developed for integration of mainframes with other Fibronics TCP/IP LAN and WAN products. Networking software developed for mainframe computers included: TCP/IP protocol stack; Network File System (server) package; File Transfer Protocol (FTP) server module; Simple Mail Transfer Protocol (SMTP); 3270 terminal emulators; X-windows client functionality.

The NFS application was the result of a nine month development effort involving a team of six software developers. The complete design, including all architectural components, was formulated from Sun Microsystems documentation, and the resulting concept was implemented from scratch in C++. A parallel research study of the competing Andrew

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File System was also carried out. The NFS product was deployed by several large Fibronics customers.

**1982 to 1988 Numerix Corporation, Newton, MA
President/CEO**

Founder and CEO of a high-technology computer company with 130 employees. Led the company from its startup in May 1982 through rapid growth. Revenues grew from \$0 to \$10M in three years.

Supervised a software and hardware development team of 50 people, and a total employee headcount of 130. Lead contract negotiations with vendors, partners and investors. Intimately involved with product engineering, quality assurance and field reliability problems.

**1975 to 1981 CNR, Inc., Newton, MA
Vice President**

Managed software and hardware design teams for defense-related projects. These included: real-time data acquisition using microprocessor systems, real-time communications channel simulators, embedded Intel and Motorola microprocessor systems, designs for the application of the Global Positioning System to air traffic control, synchronization of the DOD world-wide communication system using atomic clocks to facilitate the distribution of a high-precision time reference.

**1972 to 1975 Univ. of Auckland - New Zealand
Asst. Prof., EE**

Performed teaching and graduate research responsibilities for electrical engineering and computer science. Taught graduate level courses on control systems, communication systems, microprocessors and integrated circuit design. Taught undergraduate courses involving electromagnetic theory, electronic circuit design and mathematics

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CURRICULUM VITAE

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EDUCATIONAL BACKGROUND

Ph.D. 1991 University of Texas at Austin Computer Sciences
Thesis: *Protocol Conversion and Quotient Problems*
Advisor: Prof. Simon S. Lam
M.S. 1980 Stanford University Computer Science
S.B. 1979 M. I. T. Computer Science and Engineering

EMPLOYMENT HISTORY

2007–present Chairman, Computer Science Department, University of Kentucky
2007–present Professor, Computer Science, University of Kentucky
1998–2007 Associate Professor, Computer Science, University of Kentucky
2004–05 Acting President, Lumenware, LLC, Lexington, KY (Sabbatical)
1991–98 Assistant Professor, College of Computing, Georgia Tech
1986–91 Research Assistant, Computer Sciences, University of Texas at Austin
1984–86 Research Fellow, Computer Sciences, University of Texas at Austin
1979–84 Member of Technical Staff, Bell Telephone Laboratories, Holmdel, NJ

AREAS OF EXPERTISE

Design, implementation and analysis of computer network systems and protocols
Formal methods for distributed systems
Network security
Network topology models

CURRENT INTERESTS

Clean-slate design of internet architecture
Generalized routing and forwarding
Home networking architecture
Network topology models
Group security, trust, and security of shared network infrastructure

AWARDS AND HONORS

| | |
|--|----------------|
| Best Paper Award, IWAN 2003 Conference | Dec. 2003 |
| Gill Associate Professorship, University of Kentucky | Aug. 2002–2007 |
| Outstanding Computer Science Teacher, University of Kentucky | 2000, 2003 |
| Faculty Fellowship Award, Georgia Tech | May 1996 |
| Wm. A. “gus” Baird Teaching Award, Georgia Tech | May 1996 |

RESEARCH AND CREATIVE SCHOLARSHIP

Research Honors and Awards

Best Paper Award, IWAN 2003

Gill Associate Professorship (College of Engineering, University of Kentucky), 2002-2007

Georgia Tech College of Computing 1996 E-Systems Faculty Fellowship Award, for "Home Information Infrastructure Lab"

ACM SIGCOMM '89 Symposium Best Student Paper Award: "Deriving a Protocol Converter: A Top-Down Method"

Note: In the following paper listings, student coauthors are indicated by "*".

Journal Publications

1. S. Chakrabarti*, S. Chandrasekhar*, M. Singhal and K. L. Calvert, "An Efficient and Scalable Quasi-Aggregate Signature Scheme Based on LFSR Sequences", *IEEE Transactions on Parallel and Distributed Systems*, 20(7), July 2009, pp. 1059–1072.
2. Q. Zhang*, K. L. Calvert, "A Peer-Based Recovery Scheme for Group Rekeying in Secure Multicast", *International Journal of Network Security*, 6(1), January 2008, pp. 15–25.
3. L. Poutievski*, K. L. Calvert and J. N. Griffioen, "Routing and Forwarding with Flexible Addressing", *Journal of Communications and Networks*, 9(4), December 2007, pp. 383–393.
4. A. Sehgal*, K. L. Calvert, J. N. Griffioen, "A Flexible Concast-based Grouping Service", *Computer Networks* 50(14), October 2006, pp. 2532–2547.
5. C. S. Dhillon*, M. Bond*, J. N. Griffioen, K. L. Calvert, "Building Layered Active Services", *Computer Networks* 50(14), October 2006, pp. 2475–2487,
6. K. L. Calvert, J. N. Griffioen, S. Venkatraman, "Authenticated Access to Reserved Resources", *International Journal of Network Security*, 3(1), July 2006, pp. 54–64.
7. K. L. Calvert and J. N. Griffioen, "Scalable Network Management using Lightweight Active Services", *Journal of Network and Systems Management*, 14(1), March 2006.
8. K. L. Calvert, J. N. Griffioen, B. Mullins*, S. Natarajan*, L. Poutievski*, A. Sehgal*, and S. Wen*, "Leveraging Emerging Network Services to Scale Multimedia Applications", *Software: Practice and Experience*, volume 33, 2003, pp. 1377–1397.
9. S. Wen*, J. N. Griffioen, and K. L. Calvert, "Building Multicast Services from Unicast Forwarding and Ephemeral State", *Computer Networks* 38(3), February 2002, pp. 327–345.
10. K. L. Calvert, J. N. Griffioen, B. Mullins*, A. Sehgal*, and S. Wen*, "Concast: Design and Implementation of an Active Network Service", *IEEE Journal on Selected Areas in Communications*, 19(3), special issue on Active and Programmable Networks, March 2001, pp. 426–437.

11. R. H. Kravets*, K. L. Calvert, and K. Schwan, "Payoff Adaptation of Communication for Distributed Interactive Applications", *Journal of High-Speed Networks*, 7(1998), pp. 301–317.
12. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, and J. P. Sterbenz, "Directions in Active Networks", *IEEE Communications Magazine*, 36(10), October 1998, pp. 72–78.
13. R. D. Krupczak*, K. L. Calvert, and M. A. Ammar, "Implementing Communication Protocols in Java", *IEEE Communications Magazine*, 36(10), October 1998, pp. 93–99.
14. S. Bhattacharjee*, K. L. Calvert, and E. W. Zegura, "On Active Networking and End-To-End Arguments", *IEEE Network*, 12(3), May/June 1997, pp. 66–67.
15. M. J. Donahoo*, K. L. Calvert, and E. W. Zegura, "Center Selection and Migration for Wide-Area Multicast Routing", *Journal of High-Speed Networks*, 6(2), 1997, pp. 141–164.
16. R. J. Clark*, M. A. Ammar, and K. L. Calvert, "Protocol Discovery in Multiprotocol Networks", *Balzer/ACM Mobile Networks and Applications*, 2, 1997, pp. 271–284.
17. E. W. Zegura, K. L. Calvert, and M. J. Donahoo*, "A Quantitative Comparison of Graph-based Models for Internet Topology", *IEEE/ACM Transactions on Networking*, 5(6), December 1997, pp. 770–783.
18. R. D. Krupczak*, K. L. Calvert, and M. A. Ammar, "Increasing the Portability and Reusability of Protocol Code", *IEEE/ACM Transactions on Networking*, 5(4), August 1997, pp. 445–459.
19. K. L. Calvert, E. W. Zegura, and M. Doar, "Modeling Internet Topology", *IEEE Communications Magazine*, 35(6), June 1997, pp. 160–163.
20. R. V. Clayton* and K. L. Calvert, "Structuring Protocols with Data Streams," *Journal of Electrical and Electronics Engineering, Australia*, 16(1), March 1996, pp. 29–36.
21. K. L. Calvert, "Eliminating Disjunctions of Leads-to Properties," *Information Processing Letters*, 49(4), 24 February 1994, pp. 189–194.
22. K. L. Calvert and S. S. Lam, "Formal Methods for Protocol Conversion," *IEEE Journal on Selected Areas in Communications*, 8(1), January 1990, pp. 127–142.

Journal Papers in Preparation/Submission

S. Chakrabarti*, S. Chandrasekhar*, M. Singhal and K. L. Calvert, "A Novel Technique for Constructing Efficient Proxy Signatures Based on Trapdoor Hash Functions", in revision for resubmission.

Refereed Conference Papers

1. Onur Ascigil*, Song Yuan*, J. N. Griffioen, and K. L. Calvert, "Deconstructing the Network Layer", Proceedings of IEEE International Conference on Computer Communications and Networks (ICCCN), Future Internet Architectures and Protocols Track, St. Thomas, USVI, 4-7 August 2008.
2. K. L. Calvert, R. K. Edwards and R. Grinter, "Moving Toward the Middle: the Case Against the End-to-End Argument in Home Networking", Sixth ACM Workshop on Hot Topics in Networking, Atlanta, 14–15 November 2007.

3. S. Chandrasekhar*, M. Singhal, S. Chakrabarti and K. L. Calvert, "Efficient Blind Signatures for Accountability", Proceedings of the 2007 Workshop on Network Protocol Security (IEEE ICNP NPSec), Beijing, 16 October 2007.
4. S. Chakrabarti*, S. Chandrasekhar*, M. Singhal, K. L. Calvert, "Authenticated Feedback in Multicast Applications Using a Novel Multisignature Scheme Based on Cubic LFSR Sequences", *Third IEEE International Symposium on Security in Networks and Distributed Systems*, Niagara Falls, Canada, May 2007.
5. L. Poutievski*, K. L. Calvert, J. N. Griffioen, "Toposemantic Clustering", *IEEE Globecom 2006*, Symposium on Network Internet Services and Enabling Technologies, San Francisco, November 2006.
6. L. Wang*, J. N. Griffioen, K. L. Calvert, "An Intersection-Based Multipath Routing Scheme", *IEEE Globecom 2006*, Symposium on Network Internet Services and Enabling Technologies, San Francisco, November 2006.
7. K. L. Calvert, J. N. Griffioen, "On Information Hiding and Network Management", *ACM Workshop on Internet Network Management* (at SIGCOMM 2006), Pisa, Italy, September 2006.
8. M. Muthulakshmi, J. R. Heath, K. L. Calvert, J. N. Griffioen, "A Node-Processor Microarchitecture For Implementation of the ESP Network Service Development Paradigm", *Proceedings of the 2005 International Conference on Information Systems: New Generations*, Las Vegas, April 2005.
9. K. L. Calvert, J. N. Griffioen, B. Mullins*, L. Poutievski*, A. Sehgal*, "Secure, Customizable Many-to-One Communication", *Proceedings of IFIP International Working Conference on Active Networks (IWAN 2004)*, Lawrence, Kansas, October 28–29, 2004.
10. M. Muthulakshmi, J. R. Heath, K. L. Calvert, J. N. Griffioen, "ESP: A Flexible, High-Performance, PLD-Based Network Service", *Proceedings of 2004 IEEE International Conference on Communications—High-Speed Networks Symposium*, Paris, France, June 20–24, 2004.
11. L. Wang*, J. N. Griffioen, K. L. Calvert, S. Shi, "Passive Inference of Path Correlation", *Proceedings of NOSSDAV '04*, Cork, Ireland, June 18–19, 2004.
12. S. Shi, L. Wang*, K. Calvert, and J. N. Griffioen, "A Multipath Routing Service for Immersive Environments", *Proceedings of Workshop on Grids and Advanced Networks 2004 (GAN'04)* (at 4th IEEE/ACM International Symposium on Cluster Computing and the Grid), Chicago, April 2004.
13. L. Poutievski*, K. L. Calvert, J. N. Griffioen, "Speccast", *Proceedings of IEEE INFOCOM 2004*, Hong Kong, March 9–11, 2004.
14. N. Imam*, J. Li*, K. L. Calvert, J. N. Griffioen, "Challenges in Implementing an ESP Service", *Proceedings of the 2003 International Working Conference on Active Networks (IWAN '03)*, Kyoto, Japan, December 2003 (**Best Paper Award**).
15. Q. Zhang*, K. L. Calvert, "On Rekey Policies for Secure Group Applications", *Proceedings of the 2003 IEEE International Conference on Computer Communications and Networks (ICCCN '03)*, Dallas, Texas, October 2003, pp. 559–564.
16. B. Mullins*, J. N. Griffioen, K. L. Calvert, "Multicast TCP via Concast Merged Acknowledgements", *Proceedings of the 2003 IEEE International Conference on Computer Communications and Networks (ICCCN '03)*, Dallas, Texas, October 2003.

17. K. L. Calvert, J. Eagan*, A. Namjoshi*, S. Merugu*, J. Stasko, E. Zegura, "Extending and Enhancing GT-ITM", *Proceedings of the ACM Workshop on Networking Models, Methodologies and Tools*, (at SIGCOMM 2003), Karlsruhe, Germany, August 2003, pp. 23–27.
18. C. Jaynes, W. B. Seales, K. Calvert, Z. Fei, J. Griffioen, "The Metaverse: A networked collection of inexpensive, self-configuring, immersive environments", *7. Immersive Projection Technologies Workshop*, 9. Eurographics Workshop on Virtual Environments, Zürich, May 2003.
19. A. Sehgal*, K. L. Calvert, J. N. Griffioen, "A Generic Set-Formation Service", *Proceedings of IEEE OPENARCH 2003*, San Francisco, April 2003.
20. M. Bond*, J. N. Griffioen, C. S. Dhillon*, K. L. Calvert, "Designing Service-Specific Execution Environments", *Proceedings of the 2002 International Working Conference on Active Networks (IWAN '02)*, Zürich, Switzerland, December 2002, pp. 191–203 (Available as Springer Lecture Notes in Computer Science #2546).
21. A. Sehgal*, K. L. Calvert, J. N. Griffioen, "A Flexible Concast-based Grouping Service", *Proceedings of the 2002 International Working Conference on Active Networks (IWAN '02)* Zürich, Switzerland, December 2002, pp. 216–228 (Available as Springer Lecture Notes in Computer Science #2546).
22. K. L. Calvert, J. N. Griffioen, S. Wen*, "Lightweight Network Support for Scalable End-to-End Services", *Proceedings ACM SIGCOMM 2002*, Pittsburgh, August 2002, pp. 265–278.
23. S. Wen*, J. N. Griffioen, K. L. Calvert, "CALM: Congestion-Aware Layered Multicast", *Proceedings of IEEE OPENARCH 2002*, New York, June 2002, pp. 179–180.
24. K. L. Calvert, S. Venkatraman*, J. N. Griffioen, "FPAC: Fast, Fixed-Cost Authentication for Access to Reserved Resources", *Proceedings of IEEE INFOCOM 2002*, New York, June 2002, pp. 1049–1058.
25. M. Bond*, K. Calvert, J. N. Griffioen, B. Mullins*, S. Natarajan*, L. Poutievski*, A. Sehgal*, S. Venkatraman*, S. Wen*, "ActiveCast: Toward Application-Friendly Active Network Services", *Proceedings of DARPA Active Networks Conference and Exposition*, San Francisco, May 2002.
26. S. Bhattacharjee*, K. Calvert, Y. Chae, S. Merugu, M. Sanders, E. W. Zegura, "CANES: An Execution Environment for Composable Services", *Proceedings of DARPA Active Networks Conference and Exposition*, San Francisco, May 2002.
27. K. L. Calvert, J. N. Griffioen, S. Natarajan*, B. Mullins*, L. Poutievski*, A. Sehgal*, S. Wen*, "Leveraging Emerging Network Services to Scale Multimedia Applications", *Proceedings of IEEE 2001 International Conference on Computer Communications and Networks*, Scottsdale, Arizona, October 2001.
28. M. Sanders, M. Keaton, S. Bhattacharjee*, K. L. Calvert, S. Zabele, E. W. Zegura, "Active Reliable Multicast on CANEs: A Case Study", *Proceedings of IEEE OpenArch 2001*, Anchorage, Alaska, April 2001, pp. 49–60.
29. S. Wen*, J. N. Griffioen, K. L. Calvert, "Building Multicast Services from Unicast Forwarding and Ephemeral State", *Proceedings of IEEE OpenArch 2001*, Anchorage, Alaska, April 2001, pp. 327–345.
30. K. L. Calvert, J. N. Griffioen, A. Sehgal*, S. Wen*, "Building A Programmable Multiplexing Service Using Concast", *Proceedings of the 2000 International Conference on Network Protocols (ICNP '00)*, Osaka, Japan, November 2000, pp. 230–239.

31. S. Merugu*, S. Bhattacharjee, E. W. Zegura, K. L. Calvert, "Bowman: A Node OS for Active Networks", *Proceedings of IEEE INFOCOM 2000*, March 2000, Tel Aviv, Israel, pp. 1127-1136.
32. K. L. Calvert, J. N. Griffioen, A. Sehgal*, S. Wen*, "Concast: Design and Implementation of a New Network Service", *Proceedings of 1999 IEEE International Conference on Network Protocols (ICNP '99)*, Toronto, Canada, November 1999, pp. 335-344.
33. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Reasoning About Active Network Protocols", *Proceedings of 1998 IEEE International Conference on Network Protocols (ICNP '98)*, Austin, Texas, October 14-16, 1998, pp. 31-40.
34. R. H. Kravets*, K. L. Calvert, K. Schwan, "Payoff-based Communication Adaptation based on Network Service Availability", *Proceedings of IEEE International Conference on Multimedia Computing and Systems*, Austin, Texas, June 1998, pp. 33-42.
35. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Self-Organizing Wide-Area Network Caches", *Proceedings of IEEE INFOCOM '98*, San Francisco, April 1998, pp. 600-608.
36. R. D. Krupczak*, K. L. Calvert, M. A. Ammar, "Implementing Protocols in Java: The Price of Portability", *Proceedings of IEEE INFOCOM '98*, San Francisco, April 1998, pp. 765-773.
37. R. V. Clayton*, K. L. Calvert, "A Reactive Implementation of the Tau Protocol Composition Framework", *Proceedings of IEEE OpenArch '98*, San Francisco, April 1998, pp. 101-114.
38. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Active Networking and the End-to-End Argument", *Proceedings 1997 International Conference on Network Protocols (ICNP '97)*, Atlanta, October 1997, pp. 220-228.
39. J. T. Dixon*, K. L. Calvert, "Effective Search Strategies for Application-Independent Speedup in UDP Demultiplexing", *Proceedings of the Sixth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1997, pp. 468-474.
40. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "An Architecture for Active Networking", *Proceedings of the Seventh IFIP Conference on High Performance Networking*, White Plains, New York, April 1997, pp. 265-279.
41. R. H. Kravets*, K. L. Calvert, P. Krishnan, K. Schwan, "Adaptive Variation of Reliability", *Proceedings of the Seventh IFIP Conference on High Performance Networking*, White Plains, New York, April 1997, pp. 202-216.
42. R. D. Krupczak*, K. L. Calvert, M. A. Ammar, "Protocol Portability Through Module Encapsulation", *Proceedings of 1996 IEEE International Conference on Network Protocols (ICNP '96)*, Columbus, Ohio, October 1996, pp. 56-63.
43. J. T. Dixon*, K. L. Calvert, "Increasing Demultiplexing Efficiency in TCP/IP Network Servers", *Proceedings of the Fifth International Conference on Computer Communications and Networks (ICCCN)*, Rockville, Maryland, October 1996.
44. R. D. Krupczak*, M. A. Ammar, K. L. Calvert, "Multi-subsystem Protocol Architectures: Motivation and Experiences with an Adapter-based Approach", *Proceedings of IEEE INFOCOM '96*, San Francisco, March 1996, pp. 1149-1156.
45. E. W. Zegura, K. L. Calvert, S. Bhattacharjee*, "How to Model an Internetwork", *Proceedings of IEEE INFOCOM '96*, San Francisco, March 1996, pp. 594-602.

46. R. V. Clayton*, K. L. Calvert, "Structuring Protocols with Data Streams," Workshop on High Performance Protocol Architectures (HIPPARCH '95), Sydney, Australia, December 1995.
47. R. J. Clark*, K. L. Calvert, M. A. Ammar, "Protocol Discovery in Multiprotocol Networks", *Proceedings of the Fourth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1995, pp. 361–368.
48. M. J. Donahoo*, E. W. Zegura, K. L. Calvert, "Core Selection Methods for Multicast Routing", *Proceedings of the Fourth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1995, pp. 638–642.
49. K. L. Calvert, "Specifying and Verifying Conditional Progress", *Proceedings of the 14th International IFIP Symposium on Protocol Specification, Testing and Verification*, Vancouver, British Columbia, June 1994, pp. 303–318.
50. R. J. Clark*, M. A. Ammar, K. L. Calvert, "On the Use of Directory Services to Support Multiprotocol Interoperability", *Proceedings of IEEE INFOCOM '94*, Toronto, Canada, June 1994, pp. 784–791.
51. K. L. Calvert, "Beyond Layering: Modularity Considerations for Protocol Architectures", *Proceedings 1993 IEEE International Conference on Network Protocols (ICNP '93)*, San Francisco, October 1993, pp. 90–97.
52. R. J. Clark*, M. A. Ammar, K. L. Calvert, "Multi-Protocol Architectures as a Paradigm for Achieving Inter-Operability", *Proceedings of IEEE INFOCOM '93*, San Francisco, March 1993, pp. 136–143.
53. K. L. Calvert, "Module Composition and Refinement with Applications to Protocol Conversion," *Proceedings of 12th International IFIP Symposium on Protocol Specification, Testing, and Verification*, Orlando, June 1992.
54. K. L. Calvert, S. S. Lam, "Adaptors for Protocol Conversion," *Proceedings of IEEE INFOCOM '90*, San Francisco, June 1990.
55. K. L. Calvert, S. S. Lam, "The Protocol Conversion Problem—Finding a Quotient of Specifications," *Proceedings of the 27th Annual Allerton Conference on Communication, Control, and Computing*, Allerton, Illinois, September 1989.
56. K. L. Calvert and S. S. Lam, "Deriving a Protocol Converter: A Top-Down Method," *Proceedings of ACM SIGCOMM '89 Symposium*, Austin, Texas, September 1989, pp. 247–258 (**Best Student Paper award**).
57. K. L. Calvert and S. S. Lam, "An Exercise in Deriving a Protocol Converter," *Proceedings of ACM SIGCOMM '87 Workshop*, Stowe, Vermont, August 1987, pp. 151–160.

Patents

1. U.S. Patent #7,317,729, *System and Process for Providing Auxiliary Information for a Packet-Switched Network of Shared Nodes Using Dedicated Associative Store*, K. L. Calvert and J. N. Griffioen, granted 8 January 2008.
2. (Pending) *System and method for remote data processing and storage*, W. B. Seales, J. N. Griffioen, and K. L. Calvert, filed 21 January 2004, USPTO.

Journal Special Issue Edited

Co-Editor: *IEEE Journal on Selected Areas in Communications*, Special Issue on Active and Programmable Networks, Volume 19, Number 3, March 2001.

Conference Proceedings Edited

1. Editor: IEEE Conference on Open Architectures and Network Programming (OPENARCH '99), New York, 26–27 March 1999.
2. Co-Editor: International Conference on Network Protocols (ICNP 2002), Paris, France, 12–15 November 2002.
3. Co-Editor: International Conference on Network Protocols (ICNP 2007), Beijing, China, 16–19 October 2007.

Invited Keynote Presentations

1. “Infrastructure and Self-Organization in Postmodern Internet Architecture”, 2007 International Workshop on Self-Organizing Systems, 11–13 September, 2007, The Lake District, England.
2. “Reflections on the Development of Active and Programmable Networks”, 2005 IFIP International Working Conference on Active and Programmable Networks (IWAN 2005), November 21–23, 2005, Sophia-Antipolis, France.
3. “Active Networking Architecture: History, Observations and Issues”, Presented at the First International Workshop on Active Network Technologies and Applications, Tokyo, Japan, March 25–26, 2002.

Invited Conference Papers

1. “Separating Routing and Forwarding: A Clean-Slate Network Layer Design”, K. L. Calvert, J. N. Griffioen, and L. Poutievski*, *Proceedings of IEEE Broadnets 2007*, Raleigh, NC, September 10–14, 2007.
2. K. L. Calvert, “Active Networking Architecture: History, Observations and Issues”, *Proceedings of the First International Workshop on Active Network Technologies and Applications*, Tokyo, Japan, March 25–26, 2002.
3. K. L. Calvert, J. N. Griffioen, A. Sehgal*, and S. Wen*, “Implementing Concast” *Proceedings of the 37th Allerton Conference on Communications and Control*, Monticello, Illinois, September 22–24, 1999.
4. S. Merugu, S. Bhattacharjee, Y. Chae, M. Sanders, K. L. Calvert, and E. W. Zegura, “Bowman and CANEs: Implementation of an Active Network”, *Proceedings of the 37th Allerton Conference on Communications and Control*, Monticello, Illinois, USA, September 22–24, 1999.

Other Publications

1. K. L. Calvert, “Reflections on Network Architecture: An Active Networking Perspective”, *ACM SIGCOMM Computer Communication Review*, 36(2), April 2006, pp. 27–30.
2. K. L. Calvert (editor) “Architectural Framework for Active Networks”, DARPA Active Networks working group, July 1999.

3. J. M. Smith, K. L. Calvert, S. L. Murphy, H. K. Orman, L. L. Peterson, "Activating Networks: A Progress Report", *IEEE Computer*, 32(4), April 1999.
4. R. J. Clark*, K. L. Calvert, and M. A. Ammar, "Multiprotocol Interoperability In IPng", Internet Engineering Task Force Request for Comments 1683, August 1994.

Software

1. **GT-ITM:** A software package for constructing and analyzing graph models of large Inter-networks. It has become the *de facto* standard method of generating large random network topologies for simulations and other experiments. Used at hundreds of institutions world-wide. (Portions of the code were developed in collaboration with Ellen Zegura at Georgia Tech.)
<http://www-static.cc.gatech.edu/fac/Ellen.Zegura/graphs.html>
2. **Odyssey Environment for Active Networking:** A framework for developing and composing active network applications. Includes the **CANes** Execution Environment, one of five "sanctioned" execution environments in the DARPA Active Networks program (used by researchers at the University of Illinois and the University of Massachusetts), as well as the **Bowman:** user-space NodeOS support platform (used by researchers at the University of Illinois). Developed in collaboration with students and staff at Georgia Tech.
<http://www-static.cc.gatech.edu/projects/canes/software.html>
3. **Concast:** an implementation of the many-to-one network service for the Linux kernel. Developed in collaboration with J. Griffioen, students and staff at the University of Kentucky.
http://protocols.netlab.uky.edu/%7Eacast/concast_distribution.html
4. **Ephemeral State Processing:** multiple kernel-space implementations of ESP. Developed in collaboration with J. Griffioen and students at the University of Kentucky.
<http://protocols.netlab.uky.edu/%7Eesp/>

Invited Seminar Presentations

1. 14 April 2009, University of Göttingen, Germany. "Postmodern Routing and Forwarding Architecture".
2. 8 August 2008, NSF FIND Routing Workshop, Tucson, Arizona. "Rethinking Routing and Forwarding".
3. 20 February 2008, CS Seminar, University of California at San Diego, "Rethinking Routing and Forwarding".
4. 1 December 2006, Columbia Institute for Tele-Informatics, Columbia University, "What would one do with a Gigabit per Second?"
5. 2 November 2006, Max Plank Institut for Informatik, Saarbrücken, Germany, "Scalable Network Management Using Ephemeral State"
6. 31 October 2006, Dagstuhl Seminar on Naming and Addressing for Next-Generation Networks, "On What to Name"
7. 17 April 2006, University of Illinois at Urbana-Champaign, Department of Computer Science, "Scalable Network Management Using Ephemeral State"
8. 5 January 2006, Dagstuhl Perspective-Seminar on Autonomic Networking, "On Policies and Building-Block Functions"

9. 21 November 2005, Eurecom, Sophia-Antipolis, France, "Routing Without Addresses"
10. 4 October 2004, Dagstuhl Seminar on Service Management and Self-Organization in IP-based Networks, "Toward a More General Network Layer"
11. 24 January 2003, Duke University, Durham, NC, "Extending the Network Layer: an End-to-End Approach"
12. 4 December 2002, IBM Zürich Laboratory, Switzerland, "Extending the Waist of the Hourglass: An End-to-End Approach" (with J. Griffioen)
13. 15 February 2002, Dagstuhl Seminar on Concepts and Applications of Programmable and Active Networking Technologies, Wadern, Germany, "Scalability Considerations for Programmable Networks"
14. 28 February 2001, Computer Science Colloquium, University of North Carolina at Chapel Hill, "Concast: An Active Internet Service"
15. 18 May 2000, Workshop on Active and Programmable Networks (part of IFIP Networking 2000 Conference), "Toward an Active Internet"
16. 17 November 1998, Bellcore, Morristown, NJ, "Composable Active Network Elements"
17. 25 March 1998, Computer Science Colloquium, University of North Carolina at Chapel Hill, "Composable Active Network Elements"
18. 15 October 1997, Computer Science Colloquium, Kansas State University, Manhattan, Kansas, "What Comes After TCP?"
19. 2 September 1997, AT&T Laboratories, Florham Park, New Jersey. "Composable Active Network Elements"
20. 12 December 1996, Intel Architecture Laboratory, Hillsboro, Oregon. "The Home Information Infrastructure Project"
21. 7 August 1996, Computer Science Telecommunications Colloquium, University of Missouri at Kansas City, "Active Networking: Architecture, Applications, and Experiences"
22. 21 October 1994, Math-CS Colloquium, Emory University, Atlanta, Georgia. "Multicasting in Large Internets"
23. 16 Sept 1993, Telecomm Seminar, Clemson University, Clemson, S.C. "Modularity vs. Performance in Protocol Architectures"
24. 21 March 1991, Bell Laboratories Research Colloquium, Murray Hill, New Jersey. "Protocol Conversion and Quotient Problems"
25. 5 March 1991, Computer Science Telecommunications Program, University of Missouri at Kansas City. "Protocol Conversion and Quotient Problems"

Invited Panel Participation

1. "Visions of Networking in 2024", 2004 IEEE International Conference on Network Protocols, Berlin, Germany, October 2004.
2. "Active Networks vs. the End-to-End Argument: Are the Two Compatible?", OPENSIG 2000, Napa, California, October 2000.

3. "Symmetry, Simplicity, and Separation of Concerns in the Internet", *In Pursuit of Simplicity*, a Symposium in honor of Prof. Dr. E. W. Dijkstra on the occasion of his retirement, Austin, Texas, May 2000.
4. "Middleware", NSF Networking PI Meeting, Washington, D.C., January 1999.
5. "Intelligence in the Network", Computer Communications Workshop (IEEE Technical Committee on Computer Communications), Phoenix, Arizona, September 1997.
6. "An Active Networks Forum", Intel Architecture Labs, Hillsboro, Oregon, 1 August 1997.
7. "Interoperability: Beyond Formal Methods?", *14th International IFIP Symposium on Protocol Specification, Testing and Verification*, Vancouver, Canada, June 1994.
8. "Protocol Conversion and Internetworking", *1993 International Conference on Network Protocols*, San Francisco, October 1993.

Funded Research Proposals and Grants (while at Kentucky)

Calvert is PI unless otherwise noted.

1. *NeTS-FIND: Collaborative Research: Postmodern Internetwork Architecture*
Co-PI: J. Griffioen; Joint project with Universities of Maryland and Kansas
National Science Foundation — Networking Technology and Systems
\$399,664 (9/1/06–8/31/09)
2. *NeTS-NBD: Collaborative Research: Human-Centered Networking for the Home*
Joint project with K. Edwards and R. Grinter, Georgia Tech
National Science Foundation — Networking Technology and Systems
\$186,583 (9/1/06–8/31/09)
3. *Center for Resilient Information Systems*
U.S. Treasury Department
Technical PI: J. Griffioen; Co-PIs: Z. Fei, R. Finkel, D. Manivannan, M. Singhal
\$2,700,000 (1/1/06–5/31/07)
4. *Extending Ephemeral State Processing to Support App-level Services*
Co-PI: J. Griffioen
Cisco Systems, Inc.
\$85,477 (1/1/05–12/31/05).
5. *NeTS-NR: Generalizing the Network Layer*
Co-PI: J. Griffioen
National Science Foundation — Networking Research
\$500,000 (9/1/04–8/31/08).
6. *Enhancing Network Layer Services*
PI: J. Griffioen
Kentucky Science and Engineering Foundation R&D Excellence Award
\$86,706 (7/2/04–6/30/06).
7. *Acquisition, Representation, and Remote Visualization of Digital Artifacts*
PI: W. Seales; Co-PIs: J. Griffioen, C. Jaynes
National Science Foundation — Information Technology Research
\$1,000,000 (1/1/02–12/31/03).

8. *The Metaverse: A Laboratory for Digital Media Networks*
 PI: J. Griffioen; Co-PIs: C. Jaynes, J. Mazur, B. Seales, Z. Fei, J. McDonough, D. Maloney
 National Science Foundation — Research Infrastructure
 \$824,621 + \$400,000 University Match, (9/1/2001–8/31/2004).
9. *Enhancing Network Services Using Lightweight Router Processing Modules*
 PI: J. Griffioen
 Intel Corporation
 \$104,000 + equipment, (2/1/2001–1/31/2003)
10. *ITR/SII: Collaborative Research in Internet Topology Models*
 Joint project with E. Zegura, Georgia Tech
 National Science Foundation — Information Technology Research
 \$112,383, (9/1/00–8/31/03).
11. *Secure Multicast Services and Applications*
 Joint project with S. Lam, University of Texas
 National Science Foundation — Networking Special Projects
 \$262,985, three years.
12. *Gigabit Switch Kit*
 National Science Foundation/Washington University
 Hardware value \$50,000, July 1999.
13. *UK Laboratory for Advanced Networking*
 PI: J. Griffioen; Co-PIs: D. Friskney, M. Truszczynski
 National Science Foundation/Kentucky EPSCoR agreement
 \$1,000,000 (1/1/99–12/31/01).
14. *ActiveCast*
 Co-PIs: J. Griffioen, Kentucky; E. Zegura, Georgia Tech
 DARPA
 \$1,696,000, (5/28/99–12/31/03).
15. *CANes: Composable Active Network Elements*
 Joint project with E. Zegura, Georgia Tech
 DARPA
 \$950,000 (6/1/97–6/1/00).
16. *A Flexible End-to-End Protocol Framework*
 National Science Foundation
 \$182,305, (7/1/97–7/1/00).

TEACHING

Teaching Honors and Awards

1996 **William A. "gus" Baird Faculty Teaching Award**, presented annually to the outstanding teacher in the College of Computing at Georgia Tech

2000 **Department of Computer Science Tau Beta Pi** Outstanding Teacher Award, University of Kentucky

2000 **Department of Computer Science ACM/Upsilon Pi Epsilon Outstanding Teacher Award**, University of Kentucky

2003 **Department of Computer Science Outstanding Teacher Award**, University of Kentucky

2003 Nominated for **Henry Lutes Teaching Award**, College of Engineering, University of Kentucky

Textbooks

TCP/IP Sockets in C: Practical Guide for Programmers, second edition, M. J. Donahoo and K. L. Calvert, Morgan Kaufman, 2009. Supplementary text for networking courses. (First edition published in 2000.)

TCP/IP Sockets in Java: Practical Guide for Programmers, second edition, K. L. Calvert and M. J. Donahoo, Morgan Kaufmann, 2008. (First edition published in 2001.)

TCP/IP Sockets in C#: Practical Guide for Programmers, D. B. Makofske, K. L. Calvert and M. J. Donahoo, Morgan Kaufmann, 2004.

Ph.D. Theses Supervised

1. Robert Krupczak (co-supervised with Prof. M. Ammar)
 Graduation date: September 1997 (Georgia Institute of Technology)
 Thesis title: *Protocol Subsystem Support for Efficient and Flexible Communication Services*
 Employment: self-employed (startup)
2. Richard Clayton
 Graduation date: June 1999 (Georgia Institute of Technology)
 Thesis title: *Structuring and Destructuring Protocols*
 Employment: Adjunct Professor, Computer Science, Monmouth University, New Jersey
3. Robin H. Kravets (co-supervised with Prof. K. Schwan)
 Graduation date: August 1999 (Georgia Institute of Technology)
 Thesis title: *Cooperative Solutions to the Dynamic Management of Communication Resources*
 Employment: Associate Professor, Computer Science, University of Illinois at Urbana-Champaign
4. Samrat Bhattacharjee (co-supervised with Prof. E. Zegura)

Graduation date: August 1999 (Georgia Institute of Technology)
 Thesis title: *Active Networks: Architectures, Composition, and Applications*
 Employment: Associate Professor, Computer Science,
 University of Maryland at College Park

5. Su Wen (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2002
 Thesis Title: *Supporting Group Communication on a Lightweight Programmable Network*
 Employment: Research Scientist, Institute for Infocom Research, Singapore
6. Lili Wang (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2006
 Thesis title: *Improving End-to-End Performance Using Multipath Overlay Services*
 Employment: Juniper Networks
7. Qingyu Zhang
 Graduation date: May 2007 (Defended December 2006)
 Thesis title: *Improving Group Rekeying for Secure Multicast*
 Employment: Citrix
8. Leonid Poutievski (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2007 (Defended November 2007)
 Thesis title: *Speccast: Toward a more general network layer*
 Employment: Google
9. Amit Sehgal (co-supervised with Prof. J. Griffioen)
 Graduation date: August 2008 (Defended June 2008)
 Thesis title: *A Group-Formation Service*
 Employment: Microsoft
10. Saikat Chakrabarti (co-supervised with Prof. M. Singhal)
 Graduation date: August 2008 (Defended July 2008)
 Thesis title: *Efficient and Scalable Security Protocols Based on LFSR Sequences*
 Employment: Siemens

Masters Theses Supervised

1. Najati Imam
 Graduation date: December 2003
 Thesis title: *Implementation of an Ephemeral State Processor on the Intel IXP 1200*
2. Aditya Namjoshi
 Graduation date: December 2006
 Thesis title: *Extending and Enhancing GT-ITM*

Masters Degree Projects Supervised (last 5 years)

| Name | Completed | Topic |
|--------------|------------------|---|
| J. Satapathy | Summer 2004 | Open Flow-Based Security Layer |
| J. Li | Fall 2005 | Implementing Ephemeral State Processing Service |
| B. Mullins | Spring 2007 | Multicast TCP via Concave Merged Acknowledgments |
| T. Gupta | Spring 2008 | Universal Remote Application for Nokia N800 Used for Home Networking |
| S. Ganti | Summer 2009 | Statistical Analysis of IP Traffic |
| S. Malla | Summer 2009 | Link-State Routing Simulation |

Ph.D. Committee Member

| Student | Department | Institution | Defended |
|-----------------------|------------------------|-------------------------|-----------------|
| Rida Bazzi | Computing | Georgia Tech | 1994 |
| Russell Clark | Computing | Georgia Tech | 1995 |
| M. Jeffrey Donahoo | Computing | Georgia Tech | 1998 |
| Shengbing Jiang | Electrical Engineering | Univ. Kentucky | 2000 |
| Chris Diaz | Computer Science | Univ. Kentucky | 2002 |
| Amila Fernando | Computer Science | Univ. Sydney, Australia | 2002 |
| Darren Williams | Computer Science | Univ. Sydney, Australia | 2002 |
| Indrias Berhane | Statistics | Univ. Kentucky | 2004 |
| Osama Rawashdeh | Electrical Engineering | Univ. Kentucky | 2005 |
| Andrew Mertz | Computer Science | Univ. Kentucky | 2005 |
| Timothy Mattox | Electrical Engineering | Univ. Kentucky | 2006 |
| Mengkun Yang | Computer Science | Univ. Kentucky | 2006 |
| Bryan Crawley | Computer Science | Univ. Kentucky | 2006 |
| Wei Zhang | Mathematics | Univ. Kentucky | 2007 |
| Sylvain Martin | Computer Science | Univ. de Liège | 2007 |
| Santosh Chandrasekhar | Computer Science | Univ. Kentucky | |

Courses Taught (last three years)

| Term | Course | Title | # Students |
|-------------|---------------|--|-------------------|
| Spring 2005 | CS 275 | Discrete Mathematics | 29 |
| Fall 2006 | CS 571 | Computer Networks | 25 |
| Spring 2007 | CS 471G | Computer Networks & Distributed OSs | 15 |
| Fall 2007 | CS 671 | Advanced Computer Networks | 8 |
| Spring 2008 | CS 375 | Logic and Theory of Comp. | 21 |
| Fall 2008 | CS 499 | Senior Design | 16 |
| Fall 2008 | CS 100 | Intro to CS Professions | 85 |
| Fall 2009 | CS 100 | Intro to CS Professions | 130 |
| Fall 2009 | CS 585 | Cybercrime: Legal Issues and Investigative Procedures | 10 |

Curriculum Development

Systems Area Curriculum. Redesign of systems courses in Department of Computer Science at U.K., 1998–99.

Computer Engineering Program Committee. Development of curriculum proposal for a Computer Engineering program at the University of Kentucky, 1999–2000.

New courses developed include: **Formal Methods for Communicating Systems** (gradu-

ate), **Computer Network Protocols** (upper-division undergraduate lab course), **Network Security** (graduate), **Advanced Computer Networks** (graduate), **Network Algorithmics** (graduate), **Cybercrime: Legal Issues and Investigative Procedures** (co-developed with Dr. Thomas Johnson).

Other Academic and Teaching Activities

1. NSF-sponsored Symposium "Teaching Formal Methods to Undergraduates", Southwestern University, Georgetown Texas, 3–6 June 1993. Presentation: "What Every Undergraduate Should Know About the Curry-Howard Isomorphism".
2. Programming Team Coach for ACM Programming Contest at Georgia Tech, 1995, 1997, 1998. Team advanced to World Championships in 1995.
3. Module on Networking, taught to Rogers Scholars (high school students from Eastern Kentucky) Summer 2000.

PROFESSIONAL ACTIVITIES AND SERVICE

Professional Societies

Senior Member, Institute of Electrical and Electronics Engineers, also Computer and Communications Societies. **Vice-Chair** of IEEE Computer Society Technical Committee on Computer Communications, 2004-2007.

Member, Association for Computing Machinery, also Special Interest Group on Computer Communications (SIGCOMM)

Editorial and Reviewer Work for Technical Journals and Publishers

Associate Editor for *IEEE/ACM Transactions on Networking*, 1999–2005. (This is the top journal in my field. According to CiteSeer, it has the fourth-highest impact rating among CS journals.)

Referee for (not an exhaustive list):

IEEE/ACM Transactions on Networking
IEEE Transactions on Communications
Information Processing Letters
ACM Transactions on Programming Languages and Systems
IEEE Transactions on Software Engineering
Computer Networks and ISDN Systems
ACM SIGCOMM Conference
IEEE INFOCOM Conference

Conference Committee Activities

Steering Committee Member, International Conference on Network Protocols, 2004–present.

General Co-Chair, IEEE International Conference on Network Protocols, 1997, Atlanta, Georgia

Technical Program Chair, IEEE Conference on Open Architectures and Network Programming, 1999 (OpenArch '99)

Technical Program Co-Chair, IEEE International Conference on Network Protocols 2002, 2007

General Co-Chair, IEEE International Conference on Network Protocols 2003

Technical Program Co-Chair, 2004 IFIP International Working Conference on Active Networks (IWAN '04)

Technical Program Committee Member:

| | |
|---|-------------------------|
| ACM SIGCOMM Conference | 2004 |
| IEEE International Conf. on Network Protocols | '94, '97–'04, '06 |
| IEEE Infocom | '98, '01–'03, '06 |
| Int'l Conf. on Distributed Computing Systems | '98, '00, '02, '03, '06 |
| IEEE Int'l Conf. on Computer Comm. & Networks | '96, '97 |
| IEEE OpenArch | '99, '00–'02 |
| IFIP Int'l Working Conf. on Active Networks | '02–'06 |
| IEEE Globecom, various symposia | '06 |

Tutorial Presentations

Active Networks (half-day tutorial) at International Conference on Network Protocols, Osaka, Japan, November 2000.

Conference Sessions Chaired

"Multicasting", *1994 IEEE International Conference on Network Protocols*, Boston, October 1994.

"Active Networks", *IEEE Infocom '98*, San Francisco, April 1998.

"Security and Verification", *1998 IEEE International Conference on Network Protocols*, Austin, October 1998.

"Pervasive Computing", *OPENSIG 2000*, Napa, California, October 2000.

"Topology Modeling", *INFOCOM 2002*, New York, June 2002.

"Network Geometry and Design", *SIGCOMM 2004*, Portland, Oregon, August 2004.

Consulting and Advisory Work

GTE Mobile Communications Corporation, Atlanta, Georgia, October 1994.

AT&T Bell Laboratories, Holmdel, NJ, Summer 1995.

DVT, Norcross, Georgia, 1996–98.

EG Technologies, Atlanta, GA, technical advisory board, 2001.

Research Project Reviewer

National Science Foundation—Communications and Networking Systems (multiple panels).

Swiss National Science Foundation, external proposal review.

Government of Hong Kong, external grant proposal review.

Campus Service

Committee Service (selected)

| | |
|---|--------------|
| University Faculty Senate (Elected from College of Engineering) | 2005–2008 |
| Computer Security and Resource Allocation Task Force | 2002–present |
| Computer Engineering Program Proposal | 1999–2000 |

Faculty Advisor for the Student Chapter of the Association for Computing Machinery (Georgia Tech College of Computing), 1992–1998.

EXHIBIT 46

BRADFORD CORNELL

March 2012

Senior Consultant

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55 South Lake Avenue, Suite 650
Pasadena, CA 91101
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EDUCATION

Ph.D., Financial Economics, Stanford University

M.S., Statistics, Stanford University

A.B., (Interdepartmental) Physics, Philosophy, and Psychology Stanford University

ACADEMIC AND PROFESSIONAL POSITIONS

| | |
|-----------------------|---|
| December 2011–Present | <i>Senior Consultant, Compass Lexecon</i> |
| 1999–December 2011 | <i>Senior Consultant, CRA</i> |
| 2005–Present | <i>Visiting Professor of Financial Economics, California Institute of Technology</i> |
| 1987–2005 | <i>Professor of Finance and Director of the Bank of America Research Center, Anderson Graduate School of Management, UCLA</i> |
| 1990–1999 | <i>President, FinEcon: Financial Economic Consulting</i> |
| 1988–1990 | <i>Vice-President and Director of the Securities Litigation Group, Economic Analysis Corporation</i> |
| 1979–1986 | <i>Assistant and Associate Professor of Finance, UCLA</i> |
| 1983–1984 | <i>Visiting Professor of Finance, California Institute of Technology</i> |
| 1977–1979 | <i>Assistant Professor of Finance, University of Southern California</i> |
| 1975–1977 | <i>Assistant Professor of Finance, University of Arizona</i> |

PUBLICATIONS

Books and book chapters

“Stock Repurchases: Tradeoffs and Trends.” *Dividends and Dividend Policy*, H. Kent Baker, ed., Blackwell Publishing, New York, 2009.

“Securities Fraud Damages.” With J. Hirshleifer and J. Haut. *Developments in Litigation Economics*, Vol. 87, P. Gaughan and R. Thornton, eds., Elsevier, Ltd., Oxford, UK, 2005.

The Equity Risk Premium and the Long-run Future of the Stock Market. John Wiley and Sons, New York, NY, 1999.

“Corporate Valuation.” *Handbook of Modern Finance*, 3rd edition, Dennis Logue, ed., Warren Gorham Lamont, Boston, MA, 1994.

Corporate Valuation: Tools for Effective Appraisal and Decision Making. McGraw-Hill, New York, NY, 1993.

Academic articles

“Competition in Portfolio Management: Theory and Experiment.” With E Asparouhova, P Bossaerts, Jernej Copic, Jaksa Cvitanic and D Meloso, under review, *Review of Financial Studies*.

"Dividend-Price Ratios and Stock Returns: Another Look at the History," under review.

"Demographics, DGP and Future Stock Returns: The Implications of Some Basic Principles" *Journal of Portfolio Management*, forthcoming 2012.

“Market Efficiency and Securities Litigation: Implications of the Appellate Decision in Thane,” *Virginia Law and Business Review*, 2011, Vol. 6, 2, 237–255.

“Investment Strategies and Investment Track Records,” invited editorial, *Journal of Portfolio Management*, 2011, Vol. 37, 4, 3–5.

“The Intriguing Case of KMP and KMR,” *Journal of Portfolio Management*, 2011, Vol. 37, 3, 121–127.

“Warren Buffett, Black-Scholes, and the Valuation of Long-Dated Options,” *Journal of Portfolio Management*, Summer 2010, Vol. 36, 4, 107–111.

“Economic Growth and Equity Investing.” *Financial Analysts Journal*, January/February, 2010, Vol. 66, 1, 54–64. Winner Graham and Dodd G&D Scroll Award for 2010.

“Beliefs Regarding Fundamental Value and Optimal Investing.” With J. Cvitanic and L. Goukasian, *Annals of Finance*, January 2010, Vol. 6, 1, 83–105.

“Collateral Damages and Securities Litigation.” With J. Rutten. *Utah Law Review*, Vol. 2009, 3, pp. 717–748.

“The Fundamental Nature of Recessions: A Contracting and Restructuring Approach, *The Economists Voice*, October 2009, pp. 1–4.

“The Pricing of Volatility and Skewness.” *Journal of Investing*, Vol. 18, Fall 2009, pp. 27–31.

- “Implications of the Financial Crisis for Financial Education.” *Journal of Financial Education*, Vol. 35, Spring, pp. 1–6.
- “Investment Research: How Much Is Enough.” Management Online Review, Oxford Management Publishing, 2009, <http://www.morexpertise.com/download.php?id=135>.
- “Luck, Skill, and Investment Performance.” *Journal of Portfolio Management*, Vol. 35, Winter 2009, pp. 85–89. Winner Bernstein/Fabozzi Award for 2009.
- “The Basic Speed Law for Capital Market Returns.” *CFA Magazine*, November/December 2008, pp. 10–11. Also published electronically by *Real Capital Markets*, October 24, 2008, http://www.realcarmarkets.com/articles/2008/10/the_basic_speed_law_for_capita_1.html.
- “The Impact of Analysts’ Forecast Errors and Forecast Revisions on Stock Prices.” With W. Beaver, W. Landsman, and S. Stubben. *Journal of Business Finance and Accounting*, Vol. 35, No. 5/6, 2008, pp. 709–740.
- “Market Efficiency, Crashes, and Securities Litigation.” With J. Rutten. *Tulane Law Review*, Vol. 81, No. 2, 2006.
- “Dividends, Stock Repurchases, and Valuation.” *Journal of Applied Finance*, Vol. 15, No. 2, 2005, pp. 13–24.
- “How Do Analysts’ Recommendations Respond to Major News?” With J. Conrad, W. Landsman, and B. Roundtree. *Journal of Financial and Quantitative Analysis*, Vol. 41, No. 1, 2006, pp. 39–68.
- “A Delegated Agent Asset Pricing Model.” With R. Roll. *Financial Analysts Journal*, Vol. 61, No. 1, 2005, pp. 57–69. Winner Graham and Dodd G&D Scroll Award for 2006.
- “Co-movement as an Investment Tool.” *Journal of Portfolio Management*, Vol. 30, Spring 2004, pp. 1–5.
- “Compensation and Recruiting: Private Universities vs. Private Corporations.” *Journal of Corporate Finance*, Vol. 10, No. 1, 2004, pp. 37–52.
- “Accounting and Valuation: Is the Quality of Earnings an Issue?” With W. Landsman. *Financial Analysts Journal*, Vol. 59, No. 6, 2003, pp. 20–28.
- “The Information that Boards Really Need.” *Sloan Management Review*, Vol. 44, Spring 2003, pp. 71–76.
- “When is Bad News Really Bad News.” With J. Conrad and W. Landsman. *Journal of Finance*, Vol. 57, December 2002, pp. 2507–2532.
- “The Parent Company Puzzle: When is the Whole Worth Less than the Sum of the Parts.” With Q. Liu. *Journal of Corporate Finance*, Vol. 4, December 2001, pp. 341–366.
- “Is the Response of Analysts to Information Consistent with Fundamental Valuation? The Case of Intel.” *Financial Management*, Vol. 30, Spring 2001, pp. 113–136.
- “Equity Duration, Growth Options, and Asset Pricing.” *Journal of Portfolio Management*, Fall 2000, pp. 171–180.
- “Risk, Duration, and Capital Budgeting: New Evidence on Some Old Questions.” *Journal of Business*, Vol. 2, April 1999, pp. 183–200.

- “The Term Structure, the CAPM, and the Market Risk Premium: An Interesting Puzzle.” *Journal of Fixed Income*, Vol. 4, December 1998, pp. 85–89.
- “Cash Settlement when the Underlying Securities are Thinly Traded: A Case Study.” *Journal of Futures Markets*, Vol. 17, No. 8, 1997, pp. 855–871.
- “Estimating the Cost of Equity Capital.” With J. Hirshleifer and E. James. *Contemporary Finance Digest*, Vol. 1, Fall 1997, pp. 5–26.
- “The Valuation of Complex Derivatives by Major Investment Firms: Empirical Evidence.” With A. Bernardo. *Journal of Finance*, Vol. 52, June 1996, pp. 785–798.
- “Culture, Information, and Screening Discrimination.” With I. Welch. *Journal of Political Economy*, Vol. 104, June 1996, pp. 542–571.
- “Throwing Good Money after Bad? Cash Infusions and Distressed Real Estate.” With F. Longstaff and E. Schwartz. *Journal of the American Real Estate and Urban Economics Association*, Vol. 24, 1996, pp. 23–41.
- “An Hypothesis Regarding the Origins of Ethnic Discrimination.” *Rationality and Society*, Vol. 7, January 1995, pp. 4–29.
- “Change Reinforces Use of DCF Method.” *Natural Gas*, Vol. 11, October 1994, pp. 5–15.
- “Adverse Selection, Squeezes, and the Bid-Ask Spread on Treasury Securities.” *Journal of Fixed Income*, Vol. 3, June 1993, pp. 39–47.
- “The Reaction of Investors and Stock Prices to Insider Trading.” With E. Sirri. *Journal of Finance*, Vol. 47, July 1992, pp. 1031–1059.
- “Liquidity and the Pricing of Low-grade Bonds.” *Financial Analysts Journal*, Vol. 48, January/February 1992, pp. 63–68.
- “Measuring the Investment Performance of Low-grade Bond Funds.” With K. Green. *Journal of Finance*, Vol. 66, March 1991, pp. 29–48.
- “Using Finance Theory to Measure Damages in Fraud on the Market Cases.” With G. Morgan. *UCLA Law Review*, Vol. 37, No. 2, 1990, pp. 883–924.
- “The Incentive to Sue: An Option Pricing Approach.” *Journal of Legal Studies*, Vol. 17, No. 1, 1990, pp. 173–188.
- “Volume and R^2 .” *Journal of Financial Research*, Vol. 13, No. 13, 1990, pp. 1–7.
- “Measuring the Term Premium: An Empirical Note.” *Journal of Economics and Business*, Vol. 42, No. 1, 1990, pp. 89–93.
- “Cross Sectional Regularities in the Reaction of Stock Prices to Bond Rating Changes.” With W. Landsman and A. Shapiro. *Journal of Accounting, Auditing, and Finance*, Vol. 4, No. 4, 1989, pp. 460–479.
- “The Mispricing of US Treasury Bonds: A Case Study.” With A. Shapiro. *The Review of Financial Studies*, Vol. 2, No. 3, 1989, pp. 297–310.
- “The Impact of Data Errors on Measurement of the Foreign Exchange Risk Premium.” *Journal of International Money and Finance*, Vol. 8, 1989, pp. 147–157.

- “Security Price Response to Quarterly Earnings Announcements and Analyst Forecast Revisions.” With W. Landsman. *The Accounting Review*, Vol. 64, October 1989, pp. 680–692.
- “Financing Corporate Growth.” With A. Shapiro. *Journal of Applied Corporate Finance*, Vol. 1, summer 1988, pp. 6–22.
- “Measuring the Cost of Corporate Litigation: Five Case Studies.” With K. Engelmann. *Journal of Legal Studies*, Vol. 17, June 1988, pp. 135–162.
- “Corporate Stakeholders and Corporate Finance.” With A. Shapiro. *Financial Management*, Vol. 16, Spring 1987, pp. 5–14.
- “The Impact on Bank Stock Prices of Regulatory Responses to the International Debt Crisis.” With A. Shapiro and W. Landsman. *Journal of Banking and Finance*, Vol. 3, 1987, pp. 161–178.
- “Pricing Interest Rate Swaps: Theory and Empirical Evidence.” *Proceeding of Conference on Swaps and Hedges*, Salomon Brothers Center, New York University, 1987.
- “Forecasting the Eleventh District Cost of Funds.” *Housing Finance Review*, Vol. 6, Summer 1987, pp. 123–135.
- “Commodity Own Rates, Real Interest Rates, and Money Supply Announcements.” With K. French. *Journal of Monetary Economics*, Vol. 18, July 1986, pp. 3–20.
- “The Reaction of Bank Stock Prices to the International Debt Crisis.” With A. Shapiro. *Journal of Banking and Finance*, Vol. 10, 1986, pp. 55–73.
- “Inflation Measurement, Inflation Risk, and the Pricing of Treasury Bills.” *Journal of Financial Research*, Vol. 9, Fall 1985, pp. 193–202.
- “Interest Rates and Exchange Rates: Some New Empirical Evidence.” With A. Shapiro. *Journal of International Money and Finance*, Vol. 4, 1985, pp. 431–442.
- “The Weekly Pattern in Stock Returns: Cash versus Futures.” *Journal of Finance*, Vol. 40, June 1985, pp. 583–588.
- “The Income Approach to Valuation.” *Proceedings of the Wichita State University Conference on the Appraisal of Railroads and Public Utilities*, 1985.
- “The Value of Rate Base Options in the Eurocredit Market.” With O. Sand. *Journal of Bank Research*, Vol. 16, Spring 1985, pp. 22–28.
- “The Money Supply Announcements Puzzle: Review and Interpretation.” *American Economic Review*, Vol. 73, September 1983, pp. 644–658.
- “The Money Supply Announcements Puzzle: Reply.” *American Economic Review*, Vol. 75, June 1985, pp. 565–566.
- “Taxes and the Pricing of Stock Index Futures.” With K. French. *Journal of Finance*, Vol. 38, June 1983, pp. 675–695; reprinted in *Proceedings of the Seminar for the Analysis of Securities Prices*, University of Chicago Press, 1983.
- “Money Supply Announcements and Interest Rates: Another View.” *Journal of Business*, Vol. 56, January 1983, pp. 1–25; reprinted in *Proceedings of the Seminar for the Analysis of Securities Prices*, University of Chicago Press, 1983.

“Monetary Policy and the Daily Behavior of Interest Rates.” *Journal of Business and Economics*, Vol. 35, 1983, pp. 189–203.

“Managing Exchange Risk.” With A. Shapiro. *Midland Corporate Financial Journal*, Vol. 1, Fall 1983, pp. 16–31; reprinted in *New Developments in International Finance*, J. Stern and D. Chew, eds., Basil Blackwell, New York, 1988.

“The Pricing of Stock Index Futures.” With K. French. *Journal of Futures Markets*, Vol. 3, Fall 1983, pp. 1–14; reprinted in *Readings in Futures Markets*, Vol. 5 and in *Selected Writings on Futures Markets: Explorations in Financial Futures*; both published by the Chicago Board of Trade, 1984.

“Money Supply Announcements, Interest Rates, and Foreign Exchange.” *Journal of International Money and Finance*, Vol. 1, 1982, pp. 201–208.

“Forward versus Futures Prices: Evidence from the Foreign Exchange Markets.” With M. Reinganum. *Journal of Finance*, Vol. 36, December 1981, pp. 1035–1046.

“Taxation and the Pricing of Treasury Bill Futures.” *Journal of Finance*, Vol. 36, December 1981, pp. 1169–1176.

“The Relationship between Volume and Price Variability in Futures Markets.” *Journal of Futures Markets*, Vol. 1, Fall 1981, pp. 303–316.

“Relative vs. Absolute Price Changes: An Empirical Study.” *Economic Inquiry*, Vol. 16, April 1981, pp. 302–309.

“The Consumption Based Asset Pricing Model: A Note on Potential Tests and Applications.” *Journal of Financial Economics*, Vol. 9, March 1981, pp. 103–110.

“Strategies for Pairwise Competitions in Markets and Organizations.” With R. Roll. *Bell Journal of Economics*, Vol. 12, Spring 1981, pp. 201–216.

“What is the Future for Floating Rate Bonds?” *Chase Financial Quarterly*, Vol. 1, Fall 1981, pp. 27–38.

“The Denomination of Foreign Trade Contracts Once Again.” *Journal of Financial and Quantitative Analysis*, Vol. 5, November 1980, pp. 933–945.

“Inflation, Relative Price Changes, and Exchange Risk.” *Financial Management*, Vol. 9, Spring 1980, pp. 30–35.

“Asymmetric Information and Investment Performance Measurement.” *Journal of Financial Economics*, Vol. 7, December 1979, pp. 381–390.

“Treasury Bill Pricing in the Spot and Futures Markets.” With D. Capozza. *Review of Economics and Statistics*, Vol. 61, November 1979, pp. 513–520; reprinted in *Interest Rate Futures: Concepts and Issues*, Robert Dame International, 1981.

“A Variance Forecasting Test of the Option Pricing Model.” With D. Capozza. *Financial Review*, Vol. 7, 1979, pp. 381–390.

“Relative Price Changes and Deviations from Purchasing Power Parity.” *Journal of Banking and Finance*, Vol. 3, 1979, pp. 263–279.

“A Note on Capital Asset Pricing and the Theory of Indexed Bonds.” *Southern Journal of Economics*, Vol. 45, 1979, pp. 1239–1247.

- “Do Money Supply Announcements Affect Short-term Interest Rates?” *Journal of Money, Credit, and Banking*, Vol. 11, February 1979, 80–86.
- “Risk, Currency Substitution, and the Exchange Rate.” *Proceedings of the Fall 1978 Conference*, Federal Reserve Bank of San Francisco, 1978.
- “Determinants of the Bid-Ask Spread on Forward Foreign Exchange Contracts Under Floating Exchange Rates.” *Journal of International Business Studies*, Vol. 9, Fall 1978, pp. 33–41.
- “Using the Option Pricing Model to Measure the Uncertainty Producing Effect of Major Announcements.” *Financial Management*, Vol. 7, Spring 1978, pp. 54–59.
- “Price as a Signal of Quality: Some Additional Experimental Results.” *Economic Inquiry*, Vol. 16, April 1978, pp. 302–309.
- “Mean Absolute Deviation versus Least-Square Regression Estimation of Beta Coefficients.” With J. Dietrich. *Journal of Financial and Quantitative Analysis*, Vol. 13, March 1978, pp. 123–131.
- “Monetary Policy, Inflation Forecasting, and the Term Structure of Interest Rates.” *Journal of Finance*, Vol. 33, March 1978, pp. 117–127.
- “The Efficiency of the Market for Foreign Exchange Under Floating Exchange Rates.” With J. Dietrich. *Review of Economics and Statistics*, Vol. 60, February 1978, pp. 111–120.
- “Option Pricing in Bear and Bull Markets.” *Journal of Portfolio Management*, Vol. 4, Summer 1978, pp. 30–32.
- “Spot Rates, Forward Rates, and Exchange Market Efficiency.” *Journal of Financial Economics*, Vol. 5, August 1977, pp. 55–65; reprinted in *Frontiers in International Financial Management*, D. Lessard and J. Wiley, Eds., 1979, and in *International Finance: Concepts and Issues*, R. Kalb and G. Gay, Eds., Robert F. Dame, 1982.
- “Measuring the Informational Content of Consumer Price Announcements.” *Nebraska Journal of Economics and Business*, Vol. 16, Summer 1977, pp. 57–64.
- “Which Inflation Rate Affects Interest Rates?” *Business Economics*, Vol. 12, May 1977, pp. 22–25. Reprinted in *Certified Financial Analysts Digest*, 1977.
- “Are Deep Discount Convertibles Underpriced?” *Journal of Portfolio Management*, Vol. 3, Spring 1977, pp. 55–57.
- “Using the Goldsmith-Nagan Survey to Estimate the Liquidity Premium.” *Journal of Economics and Business*, Vol. 2, February 1977, pp. 148–151.
- “Managing Money in a Competitive Securities Market.” *Arizona Review*, Vol. 25, September 1976, pp. 1–5.
- “Asset Pricing Under Uncertain Inflation: A Note on the Work of Long and Roll.” *Intermountain Economic Review*, Vol. 7, Spring 1976, pp. 85–91.
- “The Arizona Retirement System 1956–1975: An Investment Analysis.” *Arizona Review*, Vol. 25, March 1976, pp. 1–9.

Book reviews and discussion comments

“Statistical Analysis of Price and Basis Behavior: October 12–6, 1987,” *The Stock Market: Bubbles, Volatility, and Chaos*, E. Dwyer and R. Hafer, eds., Kluwer Academic Publishers, 1990.

Review of *Futures Markets*, *Journal of Monetary Economics*, M. Streit, ed., Vol. 16, July 1985, pp. 133–135.

Review of *Exchange Rates and International Macroeconomics*, *Journal of International Money and Finance*, J. Frenkel, ed., Vol. 4, 1985, pp. 212–214.

Review of *Exchange Rate Policy*, by Ray A. Batchelor and Geoffrey Wood, *Journal of Economic Literature*, Vol. 21, 1983, pp. 1027–1029.

Working papers

“Assessing the Risk of Securities Lending Transactions.” 1999.

Social Decoding and Ethnic Discrimination, 1996, book-length manuscript.

“Using the DCF Method to Estimate the Cross-Sectional Variation of Expected Returns.” With S. Cheng. 1995

“Testing the Tax Timing Option Theory: A New Approach.” 1984.

“Determinants of Corporate Capital Structure: An Empirical Analysis.” With J. Dietrich. 1979.

AWARDS AND HONORS

Bernstein, Fabozzi/Jacobs, Levy Award for outstanding research from *The Journal of Portfolio Management*, 2010

Graham and Dodd G&D Scroll Award for research on securities analysis and valuation (with Richard Roll), 2006

I/B/E/S award for research in empirical finance (with W. Landsman and J. Conrad), 1999

Cited as one of the 10 most prolific research authors in the field of finance in “Most Frequent Contributors to the Finance Literature” by Jean Louis Heck and Phillip L. Cooley, *Financial Management*, Autumn 1988

Financial Management Association Prize for Applied Research, 1987

Institute for Quantitative Research in Finance, Research Grant, 1984

Center for the Study of Futures Markets, Research Grant, 1983

Center for the Study of Futures Markets, Research Grant, 1981

Chicago Mercantile Exchange, Research Grant, 1979

Phi Beta Kappa, Stanford University, 1970

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April 2013

Executive Vice President

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EDUCATION

June 2008 Certificate in Corporate Finance, University of California, Berkeley Extension
June 1996 Ph.D., Engineering-Economic Systems, Stanford University
June 1988 M.S., Engineering-Economic Systems, Stanford University
June 1987 B.S., Engineering & Policy, Washington University. St. Louis

PROFESSIONAL EXPERIENCE

| | | |
|--------------------------|--|--|
| Dec. 2011– Present | Compass Lexecon <i>Executive Vice President</i> | Pasadena, California |
| Feb. 2002 – Nov. 2011 | Cornerstone Research, Inc. <i>Principal</i> | Menlo Park and Los Angeles, California |
| Oct. 2001 – Feb. 2002 | Enviz, Inc. <i>Director, Professional Services</i> | Redwood City, California |
| Aug. 1999 – Oct. 2001 | Data Digest Corporation <i>Co-founder, Chief Administrative Officer, Director of Business Research</i> | San Carlos, California |
| Aug. 1994 – Aug. 1999 | Strategic Decisions Group <i>Senior Associate</i> | Menlo Park, California |

EXHIBIT 48

October 2011

**Curriculum Vitae
Lorin Moultrie Hitt**

Class of 1942 Professor
Department of Operations and Information Management
University of Pennsylvania, Wharton School
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Educational History

| | |
|---------------------------------------|--|
| Massachusetts Institute of Technology | Ph.D. Management (1996) Concentration in Information Technology and Economics Dissertation Title: "Economic Analysis of Information Technology and Organization" Committee: Erik Brynjolfsson (MIT, chair), Zvi Griliches (Harvard), Thomas W. Malone (MIT) |
| Brown University | M.S. Electrical Engineering (1989) |
| Brown University | Sc.B. Electrical Engineering with Honors, Magna Cum Laude (1988) |

Employment History

University of Pennsylvania, Wharton School, Philadelphia, PA. *Class of 1942 Professor, Department of Operations and Information Management (2008-present).*

University of Pennsylvania, Wharton School, Philadelphia, PA. *Alberto Vitale Term Associate Professor of Operations and Information Management (2002-2008).*

University of Pennsylvania, Wharton School, Philadelphia, PA. *Alberto Vitale Term Assistant Professor of Operations and Information Management (2000-2002).*

University of Pennsylvania, Wharton School, Philadelphia, PA. *Assistant Professor of Operations and Information Management (1996-2000).*

Massachusetts Institute of Technology, Industrial Performance Center, Cambridge, MA. *Graduate Fellow (1995-1996).*

Massachusetts Institute of Technology, Center for Coordination Science, Cambridge, MA. *Research Assistant (1992-1996).*

Brown University, Department of Engineering, Providence, RI and IBM T.J. Watson Research Center, Yorktown Heights, NY. *Graduate Research Assistant (1988-89).*

Brown University, Department of Engineering, Providence, RI. *Research Assistant (1987-88).*

Oliver Wyman and Company, New York, NY. *Consultant (1989-1992).*

Harry Diamond Laboratories, Adelphi, MD. *Engineering Technician (1984-87)*.

Articles Published in Refereed Journals

1. Gao, Gordon and Lorin M. Hitt (forthcoming) "IT and Product Variety: Evidence from Panel Data," *Management Science*. [A previous version appeared as: Gao, Gordon and Lorin M. Hitt (2004). "IT and Product Variety: Evidence from Panel Data," *Proceedings of the 25th Annual International Conference on Information Systems*, Washington, D.C. (Runner-up – Best Paper Award)]
2. Tambe, Prasanna and Lorin M. Hitt (forthcoming). "Information Technology and Productivity 1987-2006: Evidence from New Firm-Level Data," *Information Systems Research*.
3. Tambe, Sonny and Lorin M. Hitt (forthcoming). "Now IT's Personal: Offshoring and the Shifting Skill Composition of the US Information Technology Workforce," *Management Science*. [A previous version appeared as: Tambe, Sonny and Lorin M. Hitt (2010). "Now IT's Personal: Offshoring and the Shifting Skill Composition of the US Information Technology Workforce," *Proceedings of the 29th Annual International Conference on Information Systems*]
4. Tambe, Prasanna, Hitt, Lorin M. and Erik Brynjolfsson (forthcoming). "The Extroverted Firm: How External Information Practices Affect Productivity," *Management Science*. [A prior version appeared as: Tambe, Sonny, Hitt, Lorin M. and Erik Brynjolfsson (2008). "The Extroverted Firm," *Proceedings of the 27th Annual International Conference on Information Systems*]
5. Li, Xinxin, Hitt, Lorin M. and Z. John Zhang (forthcoming). "Product Reviews and Competition in Markets for Repeat Purchase Products," *Journal of Management Information Systems*.
6. Hitt, Lorin M, Xue, Mei, and Pei-Yu Chen (2011). "The Determinants and Outcomes of Internet Banking Adoption," *Management Science* 57(2): 291-307.
7. Li, Xinxin and Lorin M. Hitt (2010). "Price Effects in Online Product Reviews: An Analytical Model and Empirical Analysis," *MIS Quarterly* 34(4): 809-831.
8. Tambe, Sonny and Lorin M. Hitt (2010). "How Does Offshoring Affect IT Workers?" *Communications of the ACM* 53(10): 72-82.
9. Li, Xinxin and Lorin M. Hitt (2008). "Self Selection and the Information Role of Product Reviews," *Information Systems Research* 19(4): 456-474.
10. Wu, Shin-Yi, Hitt, Lorin, Chen, Pei-Yu, and G. Anandalingam (2008) "Customized Bundle Pricing for Information Goods: A Nonlinear Mixed Integer Programming Approach," *Management Science* 54(3): 608-622.
11. Hitt, Lorin M. and Sonny Tambe (2007) "Broadband Adoption and Content Consumption," *Information Economics and Policy* 19(3-4): 362-378.
12. Xue, Mei, Hitt, Lorin M. and Patrick T. Harker (2007). "Customer Efficiency, Channel Usage and Firm Performance in Retail Banking," *Manufacturing and Service Operations Management* (9): 535-558.

13. Eric K. Clemons, Gao, Gordon and Lorin M. Hitt (2006). "When Online Reviews Meet Hyperdifferentiation: A Study of the Craft Beer Industry," *Journal of Management Information Systems* 23(2): 149-171 (a previous version appeared in the *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, Honolulu, HI).
14. Jacobides, Michael G. and Lorin M. Hitt (2005). "Vertical Scope, Revisited: Transaction Costs vs. Capabilities and Profit Opportunities in Mortgage Banking," *Strategic Management Journal* 26(13): 1209-1227.
15. Hitt, Lorin M. and Pei-Yu Chen. (2005) "Bundling with Customer Self-Selection: A Simple Approach to Bundling Low Marginal Cost Goods," *Management Science* 51(10): 1481-1493.
16. Clemons, Eric K. and Lorin M. Hitt (2004). "Poaching and the Misappropriation of Information: Transaction Risks of Information Exchange," *Journal of Management Information Systems* 21(2): 87-108. [An earlier version appeared as: Clemons, Eric K. and Lorin M. Hitt (2003). "Poaching and the Misappropriation of Information: Transaction Risks of Information Exchange," *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, Honolulu, HI.]
17. Snir, Eli and Lorin M. Hitt (2004). "Vendor Screening in Information Technology Contracting with a Pilot Project," *Journal of Organizational Computing and Electronic Commerce* 14(1): 61-88. [An earlier version of this paper appeared as Snir, Eli and Lorin M. Hitt (1999), "Vendor Screening in IT Contracting with a Pilot Project (extended abstract)," *Proceedings of the 20th Annual International Conference on Information Systems*, Charlotte, N.C.: 324-327. (Runner-up for Best Paper Award).]
18. Snir, Eli and Lorin M. Hitt (2003). "Costly Bidding in Online Markets for IT Services," *Management Science* 49(11): 1504-1520.
19. Brynjolfsson, Erik and Lorin M. Hitt (2003) "Computing Productivity: Firm-Level Evidence," *Review of Economics and Statistics* 85(4): 793-808.
20. Brynjolfsson, Erik, Hitt, Lorin M. and Shinkyu Yang (2002) "Intangible Assets: Computers and Organizational Capital," *Brookings Papers on Economic Activity* (1): 137-199. [An earlier version of this paper appeared as Brynjolfsson, Erik, Hitt, Lorin M. and Shinkyu Yang (1998) "Intangible Assets: How the Interaction of Computers and Organizational Structure Affects Stock Market Valuations", *Proceedings of the 19th Annual International Conference on Information Systems*, Helsinki, Finland: 8-29.].
21. Chen, Pei-Yu and Lorin M. Hitt (2002) "Measuring Switching Costs and Their Determinants in Internet Enabled Businesses: A Study of the Online Brokerage Industry," *Information Systems Research* 13(3): 255-276. [An earlier version of this paper appeared as Chen, Pei-Yu and Lorin M. Hitt (2000) "Switching Cost and Brand Loyalty in Electronic Markets: Evidence from On-Line Retail Brokers," *21st Annual International Conference on Information Systems*, Brisbane, Australia: 134-144.]
22. Hitt, Lorin M., Wu, D.J. and Xiaoge Zhou (2002). "ERP Investment: Business Impact and Productivity Measures," *Journal of Management Information Systems* (Special Issue on ERP) 19(1): 71-98.
23. Hitt, Lorin M. and Frances X. Frei (2002). "Do Better Customers Utilize Electronic Distribution Channels? The Case of PC Banking," *Management Science* 48(6, June): 732-749.

24. Clemons, Eric K., Hann, Il-Horn, and Lorin M. Hitt (2002). "Price Dispersion and Differentiation in Online Travel: An Empirical Investigation," *Management Science* 48(4, April): 534-550.
25. Bresnahan, Timothy, Brynjolfsson, Erik and Lorin M. Hitt (2002). "Information Technology, Workplace Organization and the Demand for Skilled Labor: Firm-level Evidence," *Quarterly Journal of Economics*, 117(1): 339-376. [Reprinted as "Tecnología de la Información, Organización del Lugar de Trabajo y Demanda de Trabajadores Calificados: Evidencia a Partir de Datos de Empresa," Chapter 8 in *Reformas Y Equidad Social En America Latina Y El Caribe* (Carlos Eduardo Velez and Pax Castillo-Ruiz, eds.) Banco Interamericano de Desarrollo: 135-168 (2004). An earlier version of this paper appeared as Bresnahan, Timothy, Brynjolfsson, Erik and Lorin M. Hitt (2000) "Technology, Organization and the Demand for Skilled Labor," Chapter 5 in *The New Relationship: Human Capital in the American Corporation* (Margaret M. Blair and Thomas A. Kochan, eds.), Brookings Institution Press: 145-193.]
26. Clemons, Eric K., Hitt, Lorin M., Gu, Bin, Thatcher, Matt E. and Bruce W. Weber (2002). "Impacts of eCommerce and Enhanced Information Endowments on Financial Services: A Quantitative Analysis of Transparency, Differential Pricing and Disintermediation," *Journal of Financial Services Research* 22(1,2): 73-90.
27. Brynjolfsson, Erik and Lorin M. Hitt (2000). "Beyond Computation: Information Technology, Organizational Transformation and Business Performance." *Journal of Economic Perspectives*, 14(4): 23-48. [Reprinted as Brynjolfsson, Erik and Lorin M. Hitt (2004). "Information Technology, Organizational Transformation and Business Performance," Chapter 2 in *Productivity, Inequality and the Digital Economy* (Nathalie Greenan, Yannick L'Horty and Jacques Mairesse, eds.), MIT Press: 55-91. Also reprinted as Chapter 4 in *Inventing Organizations of the 21st Century* (Thomas Malone, Robert Laubacher and Michael S. Scott Morton, eds): 70-99.]
28. Hitt, Lorin M. (1999). "Information Technology and Firm Boundaries: Evidence from Panel Data," *Information Systems Research*, 10(2, June): 134-149.
29. Brynjolfsson, Erik and Lorin M. Hitt (1998). "Beyond the Productivity Paradox," *Communications of the ACM*, 41(8): 49-55.
30. Hitt, Lorin M. and Erik Brynjolfsson (1997). "Information Technology and Internal Firm Organization: An Exploratory Analysis," *Journal of Management Information Systems* 14 (2): 81-101.
31. Brynjolfsson, Erik and Lorin M. Hitt (1996). "Paradox Lost? Firm-Level Evidence on the Returns to Information Systems," *Management Science* 42 (4): 541-558. [reprinted as Section 1 Chapter 1 in *Beyond the IT Productivity Paradox*, (Leslie Willcocks and Stephanie Lester, eds.), John Wiley and Sons: 39-68 (1999) and Section 2 Chapter 1 in *Exploring Information Systems Research Approaches*, (Robert D. Galliers, M. Lynne Markus and Sue Newell, eds.), Routledge: 109-127 (2007). An earlier version of this paper appeared as Brynjolfsson, Erik and Lorin M. Hitt (1993) "Is Information Systems Spending Productive? New Evidence and New Results," *Proceedings of the 14th Annual International Conference on Information Systems*, Orlando, FL. December: 47-64.]. Winner of the Best Paper Award in Information Systems Economics in last seven years (1999 Workshop on Information Systems and Economics).
32. Hitt, Lorin M. and Erik Brynjolfsson (1996). "Productivity, Business Profitability, and Consumer Surplus: Three Different Measures of Information Technology Value," *MIS Quarterly* 20(2): 121-142. Winner of 1996 Best Paper award. [An earlier version of this

paper appeared as Hitt, Lorin M. and Erik Brynjolfsson (1994) "The Three Faces of IT Value: Theory and Evidence," *Proceedings of the 15th Annual International Conference on Information Systems*, Vancouver, B.C., December. (Winner of Best Paper and Best Paper Addressing Conference Theme Awards): 263-277.]

33. Brynjolfsson, Erik and Lorin M. Hitt (1995) "Information Technology as a Factor of Production: The Role of Differences Among Firms", *Economics of Innovation and New Technology* 3-4: 183-199.
34. Martin, Suzanne, Hitt, Lorin M., and James Rosenberg (1989) "p-Channel Germanium MOSFETs with High Channel Mobility," *IEEE Electron Device Letters* 10(7, July): 325-326.

Refereed Conference Proceedings (Not otherwise published in Journals)

35. Tambe, Sonny and Lorin M. Hitt (2010). "Job Hopping, Knowledge Spillovers, and Regional Returns to Information Technology Investments," *Proceedings of the 29th Annual International Conference on Information Systems*.
36. Avgar, Ariel, Tambe, Sonny and Lorin M. Hitt (2009). "The Effects of Organizational Factors on Healthcare IT Adoption Costs: Evidence from New York Nursing Homes," *Proceedings of the 2009 Hawaii International Conference on Systems Sciences: HICSS-43*.
37. Hitt, Lorin M. and Sonny Tambe (2006). "Measuring Spillovers from Information Technology Investments," *Proceedings of the 25th Annual International Conference on Information Systems*, Milwaukee, WI.
38. Wu, D.J., Ding, Min and Lorin M. Hitt (2003). "Learning in ERP Contracting: A Principal-Agent Analysis," *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, Honolulu, HI.
39. Gao, Gordon and Lorin M. Hitt (2003). "The Economics of Telecommuting: Theory and Evidence," *Proceedings of the 24th Annual International Conference on Information Systems*, Seattle, WA.
40. Chen, Pei-Yu and Lorin M. Hitt (2001) "Brand Awareness and Price Dispersion in Electronic Markets," *22nd Annual International Conference on Information Systems*, New Orleans, LA.
41. Gu, Bin and Lorin M. Hitt (2001) "Transactions Costs and Market Efficiency," *22nd Annual International Conference on Information Systems*, New Orleans, LA.

Articles Submitted to Refereed Journals and Refereed Conferences

42. Wu, D.J., Ding, Ming, and Lorin M. Hitt (2010). "IT Implementation Contract Design: Analytical and Experimental Investigation of IT Payoff, Learning and Contract Structure," (conditionally accepted, *Information Systems Research*).
43. Avgar, Ariel, Tambe, Prasanna and Lorin M. Hitt (2010). "Employee Discretion and Organizational Learning during Healthcare Information Technology Implementations," (in review).
44. Hitt, Lorin M. and Sonny Tambe (2011). "Measuring Spillovers from Information Technology Investments," (in review).

Other Publications

Chapters in Books

45. Chen, Pei-Yu and Lorin M. Hitt (2007). "Information Technology and Switching Costs," in T. Hendershott, ed., *Handbook of Information Systems Economics*.
46. Brynjolfsson, Erik and Lorin M. Hitt (2005) "Intangible but not Unmeasurable: Some Thoughts on the Measure and Magnitude of Intangible Assets," in Carol Corrado and Daniel Sichel, eds., *Measuring Capital in the New Economy*, University of Chicago Press (for NBER).
47. Brynjolfsson, Erik and Lorin M. Hitt (2005) "Intangible Assets and the Economic Impact of Computers," in William Dutton, Brian Kahin, Ramon O'Callaghan, and Andrew Wyckoff, eds., *Transforming Enterprise*, MIT Press.
48. Clemons, Eric K., Hitt, Lorin M. and David C. Croson (2001) "The Future of Retail Financial Services: Transparency, Bypass and Differential Pricing," Chapter 4 in *Tracking a Transformation: E-commerce and the Terms of Competition in Industries* (J. Zysman, ed.), Brookings Institution Press: 92-111.
49. Clemons, Eric K. and Lorin M. Hitt (2001) "Financial Services: Transparency, Differential Pricing and Disintermediation," Chapter 4 in *The Economic Payoff from the Internet Revolution* (R. Litan and A. Rivlin, eds.), Brookings Institution Press: 87-128.
50. Hitt, Lorin M., Frei, Frances X. and Patrick T. Harker. (1999) "How Financial Firms Decide on Technology," Chapter 3 in *Brookings/Wharton Papers on Financial Services: 1999*, Litan, Robert E. and Anthony M. Santomero, Eds. Washington, DC: Brookings Institution Press: 93-136.
51. Hitt, Lorin M. (1999). "The Impact of IT Management Practices on the Performance of Life Insurance Companies," Chapter 7 in *Changes in the Life Insurance Industry: Efficiency, Technology and Risk Management* (J. David Cummins and Anthony M. Santomero, eds.), Norwell, MA: Kluwer Academic Publishers: 211-243.

Trade Journal Publications

52. Brynjolfsson, Erik and Lorin M. Hitt (1997) "Breaking Boundaries", *InformationWeek* 500 September 22: 54-61.
53. Brynjolfsson, Erik and Lorin M. Hitt (1996) "The Customer Counts," *InformationWeek*, September 8: 38-43.
54. Brynjolfsson, Erik and Lorin M. Hitt (1995) "The Productive Keep Producing," *InformationWeek*, September 18: 38-43.

Working Papers

55. Housman, Michael G., Hitt, Lorin M., Elo, Kinga Z. and Nick Beard (2009). *The Effect of IT Capital on Hospital Efficiency*. (working paper, SSRN 993008)
57. Tambe, Prasanna and Lorin M. Hitt (2009). *Job Hopping, Knowledge Spillovers and Regional Returns to IT Investments*. (working paper, SSRN 1392637)
58. Tambe, Prasanna and Lorin M. Hitt (2009). *The Effect of Measurement Error on Knowledge Spillover Estimates*. (working paper, SSRN 1284373)

59. Tambe, Prasanna and Lorin M. Hitt (2009). *H-1B Visas, Offshoring, and the Wages of US Information Technology Workers*. (working paper, SSRN 1380343)

Academic Honors

Wharton Excellence in Teaching Award, Undergraduate Division (1998, 1999, 2000, 2000, 2001, 2003, 2007, 2008)
 Best Paper in Information Systems and Economics (last 7 years), Workshop on Information Systems and Economics (1999)
 Runner-up for Best Paper, International Conference on Information Systems (1999, 2004)
 David Hauck Award for Distinguished Teaching, Wharton School (1999)
 Christian R. and Mary F. Lindback Award for Distinguished Teaching, University of Pennsylvania (1998)
 National Science Foundation CAREER Program Grant Recipient (1998)
 Best Paper Award, Management Information Systems Quarterly (1996)
 International Conference on Information Systems Doctoral Consortium (1995)
 MIT Industrial Performance Center Doctoral Dissertation Fellowship (1995)
 "Best Paper" and "Best Paper Addressing the Conference Theme" Awards at the International Conference on Information Systems (1994)
 DuWayne J. Petersen Fellowship (1992-1996)
 Honorable Mention, National Science Foundation Fellowship (1989)
 Elected to Tau Beta Pi Engineering Society (1988)
 Elected to Sigma Xi Scientific Research Society (1988)
 Finalist, National Merit Scholarship Program (1985)
 National Society of Professional Engineers' Scholarship (1985)
 Honorable Mention, Westinghouse Science Talent Search (1985)

Grants

Commonwealth Fund. The Business Case for Healthcare IT in Nursing Homes. (~\$150K) (1/08 – 6/11).

Co-Principal Investigator (with Mei Xue and Patrick Harker), National Science Foundation. Collaborative Research: Customer Efficiency and the Management of Multi-Channel Service Delivery Systems. Award: ~\$250K (8/05 – 8/07)

Wharton eBusiness Initiative/Mack Center, University of Pennsylvania, Wharton School. Product Reviews, Pricing and Market Strategy. Award: \$10K (5/05-11/05)

Fishman Davidson Center, University of Pennsylvania, Wharton School. Information Technology, Product Variety and Operations (6/2004-6/2005). Award: ~\$18K.

University Research Foundation. Information Technology and Product Variety; Data Development and Analysis. Award: \$18.5K (9/2004-5/2005)

Co-Principal Investigator (with Paul Kleindorfer and D.J. Wu), SAP America. Valuation of ERP in the Oil and Gas Industry. Award: \$40K (10/02-6/03)

Principal Investigator, NSF Grant IRI-9733877 (Computing and Social Systems Program): The Economics of Information Technology, Organization and Productivity: Theory Development and Empirical Investigation. Award: \$309K (6/98-10/04)

Principal Investigator. Customer Behavior in On-Line Markets. Wharton Electronic Commerce Forum. Award: \$25K (6/00 – 6/01).

Principal Investigator. Switching Cost and Pricing in Electronic Markets. Wharton eBusiness Initiative. Award \$25K (6/01-6/02)

Journal/Conference Reviews

Editorial Board

Information Systems Research (Guest Senior Editor, 2009-present; Senior Editor, 2007-2008; Associate Editor 2000-2002, 2004 Guest Associate Editor)
Journal of Management Information Systems (2002-present)
Management Science (2002-2008; Departmental Co-Editor – Information Systems, 2008-pres.)
SSRN Information Systems and Economics (2004-2008)

Program Committee

Workshop on Information Systems and Economics (2009 Conference Co-Chair; 2004, Conference Co-Chair)
International Conference on Information Systems (2000, 2003 Associate Editor)
ACM Conference on Electronic Commerce (2007)
International Conference on Information Systems Doctoral Consortium (2007)
NYU CeDER Summer Doctoral Workshop (2007)

Ad-hoc Reviewer

American Economic Review, Canadian Journal of Economics, Canada Social Science Research and Humanities Council, City University of Hong Kong - Grant Review Committee, Communications of the ACM, Economic Inquiry, European Economic Review, European Journal of Operations Research, Hawaii International Conference on System Sciences
Industrial Relations, Industrial and Labor Relations Review, Information Economics and Policy, Information Systems Frontiers, Information Systems Research, Information Technology and Management, Journal of Banking and Finance, Journal of Industrial Economics, Journal of Law, Economics and Organization, Journal of Management Information Systems, Journal of Organizational Computing, Journal of Productivity Analysis, Management Science, Managerial and Decision Economics, Manufacturing & Service Operations Management, Marketing Science, McGraw-Hill Textbook Division, MIS Quarterly (Guest Associate Editor, 2003), National Science Foundation, Review of Economics and Statistics, Regional Science, Sloan Management Review, Quarterly Journal of Economics

Teaching Experience

Massachusetts Institute of Technology, Sloan School of Management. Course: 15.567 – Introduction to eBusiness, Fall, 2001 (2 sections, co-taught with Erik Brynjolfsson)

University of Pennsylvania, The Wharton School. Course: OPIM101 – Introduction to Operations and Information Management. Fall, 2007; Fall, 2008; Fall, 2009; Fall, 2010; Fall, 2011 (Co-instructor).

University of Pennsylvania, The Wharton School. Course: OPIM105 -- Data Analysis in VBA and SQL. Co-instructor (2011).

University of Pennsylvania, The Wharton School. Course: OPIM 469 - Advanced Topics in Information Strategy and Economics. Spring, 2000 (2 sections); Spring, 2001 (2 sections); Spring, 2002 (3 sections) (Instructor); Spring, 2003 (Co-instructor, 2 sections); Spring, 2004; Spring, 2005; Spring, 2006; Spring, 2007; Fall, 2008; Spring, 2010; Spring, 2011 (Instructor)

University of Pennsylvania, The Wharton School. OPIM669 - Advanced Topics in Information Strategy/Financial Information Systems. Spring, 1998; Spring, 1999; Spring, 2000; Spring, 2001; Spring, 2002 (Guest Lecturer); Spring, 2003 (Co-instructor); Spring, 2004; Spring, 2005; Spring, 2006; Spring, 2007 (Instructor).

University of Pennsylvania, The Wharton School. Tiger Team Field Application Project. Spring, 1999; Spring, 2000; Spring, 2001 (Faculty Advisor for Electronic Commerce/IT projects)

University of Pennsylvania, The Wharton School. Course: EMTM900 – Electronic Commerce Marketing. Spring, 2000 (Guest Lecturer)

University of Pennsylvania, The Wharton School. Course: D-SEM on Electronic Commerce. Fall, 2000

University of Pennsylvania, The Wharton School. Course: OPIM 319 - Advanced Topics in Information Strategy/Advanced Decision Support Systems (now OPIM469). Spring, 1998; Spring, 1999 (Instructor)

University of Pennsylvania, The Wharton School. Course: OPIM 210 - Management Information Systems. Fall, 1996; Spring, 1997; Fall, 1997; Spring, 1998; Spring 1999 (2 sections); Fall, 2002 (2 sections); Spring, 2004; Spring, 2006; Fall, 2006; Spring, 2007; Fall, 2007 (Instructor).

University of Pennsylvania, The Wharton School. MBA Pre-Term Exercise on Contract Negotiations for Information Technology Outsourcing. Fall, 1998; Fall, 1999 (with D. Croson and R. Croson)

University of Pennsylvania, The Wharton School. Course: OPIM 950/960/961 - Doctoral Seminar in Information Technology: Economics and Organization. Fall, 1997; Fall, 2000 w/ R. Aron as OPIM899; Fall, 2001 (Guest Lecturer); Fall, 2003 (Guest Lecturer); Spring, 2003; Fall, 2004 (Guest Lecturer); Spring, 2005; Spring, 2008; Spring, 2010.

University of Pennsylvania, The Wharton School. Course: OPIM 666 - Information: Industry Structure and Competitive Strategy. Winter Quarter, 1997; Spring Quarter, 1997 (Instructor); Guest Lecturer (Fall Quarter, 1999; Fall Quarter, 2000).

Massachusetts Institute of Technology, Sloan School of Management. Course: 15.566 - Information Technology as an Integrating Force in Manufacturing. Spring, 1995 (Teaching Assistant)

Brown University, Department of Engineering. Course: EN 162- Analog Circuit Design. Spring, 1987 (Teaching Assistant)

Professional Affiliations

Sigma Xi, Tau Beta Pi, Association for Computing Machinery, American Economic Association, INFORMS

Students Supervised

Dissertation Supervisor

Pei-Yu (Sharon) Chen (2002): Associate Professor, Temple University
 Guodong (Gordon) Gao (2005): Assistant Professor, University of Maryland
 Xinxin (Mandy) Li (2005): Assistant Professor, University of Connecticut
 Eli Snir (2001): Lecturer, Washington University
 Prasanna (Sonny) Tambe (2008): Assistant Professor, New York University

Thesis Reader

Bin Gu (2002): Assistant Professor, University of Texas at Austin
 Il-Horn Hann (2000): Associate Professor, University of Maryland
 Michael Jacobides (2000): Assistant Professor, London Business School
 Jeff McCullough (2005): Assistant Professor, University of Minnesota
 Ying Liu (2006): Assistant Professor, University of Hawaii
 Ben Powell (2003): Lecturer, University of Alabama
 Michael Row (2001): Private Industry
 Baba Prasad (2003): Unknown
 Mei Xue (2001): Associate Professor, Boston College
 Matt Thatcher (1999): Assistant Professor, University of Nevada (Las Vegas)
 Shinyi Wu (2003): Assistant Professor, Singapore Management University
 Moti Levi (2001): Private Industry
 Sergeui Roumanitsev (2006): Private Industry
 Marcelo Olivares (2007): Assistant Professor, Columbia University
 Ben Shiller (2011): Assistant Professor, Brandeis University
 Adam Saunders (2011): Adjunct Instructor, University of Pennsylvania

Other Doctoral Advising

Amanda Jensen (2010): Summer Paper Advisor
 Felipe Csaszar (2005): Academic Advisor

Masters Students

Xiaoge Zhou, OPIM Department, Wharton School (1999-2001): Thesis Supervisor
 Jihae Wee, School of Engineering and Applied Science (2003): Project Supervisor

MBA Students

Anna Blaczyck, Wharton School (2004): Independent Study Project Supervisor
 Luca Coltro, Wharton School (1997-1998): Advanced Study Project Supervisor
 Andrew Trader, Wharton School (1999): Advanced Study Project Supervisor

Undergraduate Students

Steven Altman, Wharton School (1997): Independent Study Project Supervisor
 Maury Apple, Wharton School (1997): Independent Study Project Supervisor
 Tara Bhandari, Wharton School (2002): Society Project Supervisor
 Thomas Burrell, Engineering School (2001): Senior Project Supervisor
 Todd Bishop, Wharton School (1999): Independent Study Project Supervisor

Rachel Boim, Wharton School (1999): Independent Study Project Supervisor
 Hope Bromley, Wharton School (2000): Independent Study Project Supervisor
 John Chiang, Wharton School (2001): Society Project Supervisor
 Charlene Chen, Wharton School (2005): Senior Design Project Supervisor
 Robert Dolan, Wharton School (2003-4): Wharton Research Scholars Supervisor
 Gabriel Gottlieb, School of Engineering (2002): Senior Design Project Supervisor
 Phuong Ho, Department of Economics (1998): Honors Advisor
 Richard Hooper, Systems Engineering (1999): Independent Study Project Advisor
 Johnny Kong, Wharton School (2005): Senior Design Project Supervisor
 Amin Laksmani, Computer Science and Engineering (2010): Senior Design Supervisor
 Jacob Lefkowitz, Wharton School(1998): Society Project Supervisor
 David Perez y Perez, Wharton School (1999): Independent Study Supervisor
 Nickhil Ramchandi, Wharton School (1999): Independent Study Supervisor
 Reuben Randolph, School of Engineering (1998): Project Supervisor
 Kevin Reeves, School of Engineering (2001): Independent Study Project Supervisor
 Allison Rosen, Wharton School (1997): Independent Study Project Supervisor
 Jennifer Seo, School of Engineering (2000): Senior Design Project Supervisor
 Kyle Smith, Wharton School (2001): Independent Study Project Supervisor
 David Thornton, Wharton School (2005): Senior Design Project Supervisor
 Jon Turow, Wharton School (2005-6): Independent Study Supervisor
 Udack Victor, School of Engineering (2000): Senior Design Project Supervisor
 Jason Wang, Wharton School (1998): Society Project Supervisor
 Christine Wong, Wharton School (1997): Society Project Supervisor

Other Service

University of Pennsylvania

Trustees Committee on Academic Policy (2009)
 Lindback Teaching Award Committee (1999)

Wharton School

Wharton Personnel Committee (2009-2011)
 Dean's Advisory Group (2008)
 Panel Moderator, Wharton Asia Business Forum (2006)
 Undergraduate Curriculum Design Committee (2003)
 Ph.D Program Review Committee (2000)
 Dean's Council on Education (2001)
 WebI Curriculum Development Committee (2000)

Wharton School, Undergraduate Division

Moderator, Wharton Information Technology Career Panel (1997-99)
 Graduation Speaker (1999)
 Parents Weekend Speaker (1999)
 Hauck Teaching Award Committee (2000-01)
 Electronic Commerce Concentration Advisor (2000-present)
 Wharton/Monitor Corporation Undergraduate Case Competition Judge (2001)
 Deans Award for Excellence Committee (2010, 2006)

Wharton School, Department of Operations and Information Management

Recruiting Committee (2005, 2006, 2011)
 Doctoral Admissions Committee (2004, 2005)
 Department Q-Review Committee (1999-00)
 Undergraduate Coordinator (1998-01, 2002-2008)
 Undergraduate Curriculum Committee (1998-01, 2002-2008)

- Department Computing Coordinator (1997)
- Department Representative to Wharton Computing (1997)
- Department Seminar Coordinator (1996, 2010)

MIT Center for Coordination Science

- Seminar Coordinator (1994)

National Science Foundation

- Panelist (1998, 2001, 2003, 2005, 2006)
- Participant in the NSF CISE/SBE Cyberinfrastructure Workshop (2005)

International Conference on Information Systems

- Doctoral Consortium Faculty (2006)

Other

- NYU/CeDER Summer Doctoral Consortium Faculty (2006)

Lorin M. Hitt – Prior Litigation Consulting (confidential)

(retained by the party underlined – names disguised for non-public cases)

1. Data Reseller vs. Data Provider and Securities Firm (arbitration). Consulting Expert to rebut expert report regarding extent of contractual non-performance. Specific issue relates to whether securities firm provided contractually specified data to the data reseller. Worked with Paul, Weiss, Rifkind, Wharton & Garrison; Morrison & Foerster; April, 1998 – January, 1999. Status: Work Completed.
2. Manufacturer vs. Systems Integrator. Testifying Expert to rebut damages claim of Manufacturer for failure to deliver contracted information systems by the Developer. Worked with Mayer, Brown & Platt. June, 1999 – July, 1999. Status: Settled.
3. Manufacturer vs. Competing Manufacturer. Consulting Expert on damages related to patent infringement for a methodology to create and maintain embedded information systems. Worked with Cravath, Swaine & Moore; May, 1999 – May, 2000. Status: Settled.
4. Speciality Printing Company vs. Systems Integrator. Consulting Expert on damages arising from breach of contract for the development of a market research information system. September, 1999. Status: Work Completed.
5. Medical Manufacturer vs. Internet Startup (Medical Products Distribution). Testifying expert on industry definitions for a non-competition agreement related to an online distribution business. Worked with Baker & Hochstetler. November, 1999. Status: Settled.
6. Internet Startup vs. Major Software Company. Consulting expert on patent infringement for a system to sell airline tickets to consumers. Worked with Cravath, Swaine & Moore. December, 1999-January, 2001. Status: Settled.
7. Software Developer/Reseller (shareholder securities litigation). Consulting/Testifying Expert on implementation difficulties in software contracts and systems development efforts. Worked with Arnold & Porter. June-November, 2001. Status: Report Completed.
8. SEC Enforcement Action against Ernst and Young, LLP. Testifying expert on business practices in the enterprise software industry; specific issue related to potential violations of auditor independence. Worked with Arnold & Porter. 2002 – April, 2003. Status: Trial Completed.
9. Debt Recovery Firm (representing a Travel Holding Company) vs. Systems Integrator (arbitration). Testifying expert to evaluate project management practices and project outcome for information systems project management

engagement. Worked with Arnold & Porter. August, 2003 – early 2004. Status: Settled.

10. Security Software Provider (shareholder securities litigation). Consulting expert on issues related to the volatility of enterprise IT spending and expenditure on security software. Worked with O'Melveny and Myers. April, 2004 – October, 2004. Status: Work Completed.
11. Security Software Provider vs. Competing Security Software Provider (contract dispute related to patent infringement settlement agreement). Testifying expert analyzing extent to which an alleged contract breach was material; specific issue related to a pricing provision for corporate customers. Worked with Robins, Kaplan, Miller & Ciresi. April, 2005-August, 2005. Status: Settled.
12. SCO v. IBM (multiple issues, relating to patent and copyright infringement). Testifying expert relating to the valuation of intellectual property incorporated into Linux. Worked with Cravath, Swaine & Moore. January, 2006 – October, 2006. Status: Work Completed (case ongoing).
13. Consumer Class Action vs. Software Firm (deceptive advertising). Testifying expert regarding the role of consumer information in purchasing decisions for computer hardware and software. Worked with Montgomery, McCracken, Walker & Rhoads. January 2008-October, 2008. Status: Class decertified after expert reports and depositions.
14. Software Firm vs. Spinoff Software Firm (contract dispute). Testifying expert related to software support practices, pricing and product differentiation in database software. June-August, 2009. Worked with Wilson, Sonini, Goodrich & Rosati. Status: Work Completed.
15. Consumer Class Action vs. Semiconductor Firm (deceptive advertising). Testifying expert related to role of benchmarks in affecting consumer purchase decisions for computer products. Worked with Perkins Coie. April, 2010 – present. Status: Inactive; most of the case dismissed.
16. Bondholder Group vs. Investment Firm (fraud, negligence). Testifying expert related to role of information technology infrastructure in a bankruptcy that followed a leveraged buyout. Worked with Simpson, Thatcher and Bartlett. Status: On Hold.
17. Technology Firms vs. Software Vendor (patent infringement, multiple issues). Consulting and potential testifying expert on value of features in an enterprise software product. Worked with Dickstein Shapiro, LLP & Finnegan, Henderson, Farabow, Garrett & Dunner, LLP. December, 2010- present. Status: On hold given favorable Markman hearings.

18. Direct and Indirect Purchasers vs. Consumer Electronics Manufacturers (class action with multiple defendants regarding price fixing and collusion). Consulting and potential testifying expert on economics of pricing, product differentiation and production in technology products. Working with Pillsbury, Winthrop, Shaw and Pittman. May, 2011- present. Status: Class Settled After Reports and Depositions; “opt-out” actions ongoing
19. Patent Holding Company vs. Computer & Computer Component Manufacturers (multiple defendants; patent infringement). Consulting and potential testifying expert on value of various power management technologies for laptop computers. Working with Perkins Coie. July, 2011- present.

EXHIBIT 49

CORNERSTONE RESEARCH

Shankar Iyer

Vice President
Washington

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F (202) 912-8999
siyer@cornerstone.com
vCard

Shankar Iyer specializes in applying economic analyses to intellectual property, antitrust, and other complex commercial contract disputes. Mr. Iyer has managed several large cases that have gone to trial. He has also worked with numerous faculty and industry experts in the areas below.

EDUCATION

University of Florida, M.A.

Presidency College, Kolkata, India,
B.Sc. (First Class Honors)

Intellectual Property

Mr. Iyer has consulted on numerous high-profile matters in intellectual property. His work covers a broad range of issues such as market analysis, lost profits assessments, consumer surveys and other market-based approaches to evaluate the contribution of intellectual property, and determination of reasonable royalty rates. He has also managed matters related to both commercial success and irreparable harm and has experience in trademark and trade dress cases that include confusion, dilution, blurring, tarnishment, and other harm-to-brand issues.

Antitrust

Mr. Iyer has analyzed topics at the intersection of intellectual property and antitrust, including patent misuse and fair, reasonable, and nondiscriminatory (FRAND) licensing terms. His antitrust and competition experience encompasses class certification and merits stages in cases involving monopolization, price-fixing, and exclusive-dealing claims.

Complex Commercial Disputes

Mr. Iyer's economic analyses of complex commercial disputes has included:

- Criminal defense in a high-profile bankruptcy in the auto industry;
- Analysis of telecommunications industry dynamics and assessing validity of multi-billion dollar damage shareholder claims for the alleged marketing failure in the satellite telephone industry;
- Numerous disputes related to licensing, co-development, and collaboration, especially in the biotechnology and life

sciences industries; and

- Work with marketing and consumer behavior experts in consumer fraud and product liability litigation.

Mr. Iyer authored "Patent Damages in the Wake of *Uniloc v. Microsoft*," published in the ABA Section of Litigation's spring 2012 issue of the *Intellectual Property* newsletter. Prior to joining Cornerstone Research, Mr. Iyer completed his Ph.D. coursework in applied microeconomics and industrial organization at the University of Florida.

EXHIBIT 50



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

ETH Zurich - D-ITET - TIK - CSG Group - People - Prof. Bernhard Plattner

Prof. Bernhard Plattner



ETH Zürich
Prof. Bernhard Plattner
Inst.f.Techn.Informatik u.Kommunik.Netze
ETZ G 89
Gloriastrasse 35
8092 Zürich
Phone: +41 44 632 70 00
Fax: +41 44 632 10 35
E-Mail: plattner@tik.ee.ethz.ch

Bernhard Plattner is a Full Professor of computer engineering at ETH Zurich (Swiss Federal Institute of Technology) in Zurich, Switzerland, where he leads the [Communication Systems Group](#).

He has been the principal investigator or Co-PI of numerous national and international projects in the area of computer networking. His current research interests are in self-organizing networks, mobile ad-hoc networks, as well as practical aspects of information security. He has also directed research on active networks, starting as early as 1996, and multimedia applications for high-speed networks. In 1996–1998, he served as the Head of Faculty of Electrical Engineering at ETH Zürich. Between 2005 to 2007 he served as the Vice-Rector of ETH Zurich in charge of Bachelor and Master studies.

Dr. Plattner is a member of the ACM, the IEEE, and the Internet Society. He served as the program or general chair of various international conferences, such as ACM SIGCOMM'91, INET'94, and IWAN 2002, and has served in the program committees of other major conferences, such as IEEE INFOCOM.

Recent Publications

Please also refer to the list of [publications since 2001](#) and [publications from CSG](#).

Journal Papers

The Role of Network Trace Anonymization under Attack

Martin Burkhart, Dominik Schatzmann, Brian Trammell, Elisa Boschi and *Bernhard Plattner*
ACM SIGCOMM Computer Communication Review (CCR), January 2010. ► [BibTeX](#)

Decoding the perioperative process breakdowns: a theoretical model and implications for system design

Svetlana Taneva, Gudela Grote, A Easty and *Bernhard Plattner*
International Journal of Medical Informatics, January 2010. ► [BibTeX](#)

Towards improving inter-team coordination in the surgical process: a breakdown detection method

Svetlana Taneva, *Bernhard Plattner*, C Byer, J Higgins and A Easty
2010. ► [BibTeX](#)

Routing metrics for wireless mesh networks

Georgios Parissidis, Merkourios Karaliopoulos, Rainer Baumann, Thrasyvoulos Spyropoulos and *Bernhard Plattner*
Guide to wireless mesh networks - book chapter, January 2009. ► [BibTeX](#)

Approaching the hotspot increases the impact: process breakdowns in a safety-critical system-of-systems

Svetlana Taneva, J Higgins, A Easty and *Bernhard Plattner*
2009. ► [BibTeX](#)

Conference and Workshop Papers

Obfuscating IEEE 802.15.4 Communication Using Secret Spreading Codes

Björn Muntwyler, Vincent Lenders, Franck Legendre and *Bernhard Plattner*
Annual Conference on Wireless On-Demand Network Systems and Services (WONS), ★ **Best Paper Award** ★, January 2012. ► [BibTeX](#)

An Analytical Model for Streaming over TCP

Jinyao Yan, Wolfgang Mühlbauer and *Bernhard Plattner*
NEW2AN, 2011. ► [BibTeX](#)

30 Years of Wireless Ad Hoc Networking Research: What about Humanitarian and Disaster Relief Solutions? What are we still missing?

EXHIBIT 51

MATTHEW CARDEN
Costa Mesa CA 949-677-8398
matt@cardenassoc.com

Education

DUKE UNIVERSITY LAW SCHOOL, J.D., Order of the Coif, magna cum laude, 2007

UNIVERSITY OF WISCONSIN, MADISON, B.S., Computer Science, cum laude, 1986

PRINCETON UNIVERSITY, 1981-1983

- Electrical Engineering/Computer Science major; GPA = 3.79
- National Merit Scholarship

Experience

Independent Expert Consultant and Attorney

2009-present, Costa Mesa, CA

- Worked as a consulting technical expert in various patent litigation matters.

IRELL & MANELLA – Associate Attorney

2007-2009, Newport Beach, CA

- Analyzed source code to show infringement and invalidity.
- Evaluated patents for contingency intake.
- Worked on all aspects of patent reexamination proceedings.
- Managed 11 technical experts across several cases.
- Member of Hiring Committee.

CLEARY, GOTTlieb, STEEN & HAMILTON – Summer Associate

Summer 2006, London and New York

- Assisted the government of Iraq in restructuring over \$50 billion of Saddam-era debt.
- Worked for Russian oil company Rosneft on its \$10 billion IPO, then the fifth largest in history.

NORTH CAROLINA DEPT. OF JUSTICE – Summer Intern

Summer 2005, Raleigh, NC

- Developed arguments for a \$170 million software procurement case.

CHESS VENTURES – Consultant/Management

2001-2003, San Francisco, CA

- Performed technical due diligence and evaluated startups for potential venture funding.
- Assessed the value of dozens of issued and pending patents.
- Advised portfolio companies on products/operations.

NEOLITHIK – Principal (Independent Consulting)

2000-2001, San Francisco, CA

- Performed technical due diligence for various venture capital firms.
- Served as Chief Technology Officer of a startup that commercialized Bayesian analytics the US military had used to predict guerrilla attacks.

ITHORITY - Chief Technology Officer/ VP Product Strategy

1999-2000, San Francisco, CA

- Helped create this online marketplace for connecting employers and freelancers.
- Helped negotiate the company's successful acquisition by Opus360/FreeAgent.com.

VARIOUS HIGH-TECH EMPLOYERS

1986-1999, in the San Francisco Bay Area and Colorado

- Roles included Principal Engineer, Software Architect, and Product Line Manager.
- Employers included Hewlett-Packard, Network General, Open Market, and Perspecta.
- Wrote over 100,000 lines of code for various companies (in Java, C, C++, assembly, etc.).

EXHIBIT 52

FEES INCURRED BY JUNIPER DAMAGES EXPERT BRADFORD CORNELL AND COMPASS LEXECON

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|----------------------------|--|--------------------|---------------------|
| Bradford Cornell | \$975.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Reviewed and analyzed Leitzinger and Nettles expert reports • Reviewed and analyzed case documents and deposition testimony | 47.00 | \$45,825.00 |
| Elisabeth Browne | \$695.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed issues for expert report • Reviewed and analyzed Leitzinger and Nettles expert reports • Reviewed and analyzed case documents and deposition testimony | 181.25 | \$125,968.75 |
| Research Analysts | \$421.24 (blended rate) | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed issues for expert report • Reviewed and analyzed Leitzinger and Nettles expert reports • Reviewed and analyzed case documents and deposition testimony | 562.25 | \$236,841.25 |
| | | | TOTAL: | \$408,635.00 |

FEES INCURRED BY JUNIPER LICENSING AND DAMAGES EXPERT LORIN HITT AND CORNERSTONE RESEARCH

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|--------------------|--|--------------------|---------------------|
| Lorin Hitt | \$700.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed technical and other issues for expert report • Reviewed and analyzed Leitzinger, Nettles, and Alexander expert reports • Reviewed and analyzed case documents and deposition testimony | 95.00 | \$66,500.00 |
| Shankar Iyer | \$510.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed issues for expert report • Reviewed and analyzed Leitzinger expert report • Reviewed and analyzed case documents and deposition testimony | 130.00 | \$66,300.00 |
| Jun Wen | \$360.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed issues for expert report • Reviewed and analyzed Leitzinger and Nettles expert reports • Reviewed and analyzed case documents and deposition testimony | 247.00 | \$88,920.00 |
| Ali Emre Uyar | \$440.00 | <ul style="list-style-type: none"> • Researched and analyzed issues for expert report | 38.00 | \$16,720.00 |

| | | | | |
|-------------------|----------------------------|---|---------------|--------------|
| | | <ul style="list-style-type: none"> • Reviewed and analyzed Leitzinger expert report • Reviewed and analyzed case documents and deposition testimony | | |
| Research Analysts | \$242.07 (blended rate) | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Researched and analyzed issues for expert report • Reviewed and analyzed Leitzinger expert report • Reviewed and analyzed case documents and deposition testimony | 183.00 | \$44,298.75 |
| | | | TOTAL: | \$282,738.75 |

FEES INCURRED BY JUNIPER INVALIDITY EXPERT KENNETH CALVERT

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|--------------------|---|--------------------|---------------------|
| Kenneth Calvert | \$300.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Reviewed and analyzed prior art • Reviewed and analyzed re-exam documents • Reviewed and analyzed Nettles validity report • Prepared for deposition; gave deposition testimony | 154.785 | \$46,435.50 |
| | | | TOTAL: | \$46,435.50 |

FEES INCURRED BY JUNIPER NON-INFRINGEMENT EXPERT PETER ALEXANDER

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|--------------------|--|--------------------|---------------------|
| Peter Alexander | \$475.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised expert report • Reviewed and analyzed Juniper source code • Reviewed and analyzed Nettles infringement report and Implicit infringement contentions • Reviewed and analyzed documents and deposition testimony • Prepared for deposition; gave deposition testimony | 222.00 | \$105,450.00 |
| | | | TOTAL: | \$105,450.00 |

FEES INCURRED BY JUNIPER PRIOR ART EXPERT BERNHARD PLATTNER

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|--------------------|--|--------------------|---------------------|
| Bernhard Plattner | \$300.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised '163 and '857 re-exam comments • Reviewed and analyzed prior art • Reviewed and analyzed Implicit's re-exam materials | 43.75 | \$13,125.00 |
| | | | TOTAL: | \$13,125.00 |

FEES INCURRED BY JUNIPER RE-EXAM & TECHNICAL CONSULTANT MATTHEW CARDEN

| Timekeeper | Hourly Rate | Summary of Tasks Completed | Total Hours | Total Billed |
|-------------------|--------------------|--|--------------------|---------------------|
| Matthew Carden | \$275.00 | <ul style="list-style-type: none"> • Drafted/reviewed/revised '163 and '857 re-exam comments • Reviewed and analyzed Juniper's source code • Assisted with Juniper's summary judgment motions | 608.60 | \$167,365.00 |
| | | | TOTAL: | \$167,365.00 |

EXHIBIT 53

ZABELLO

AIPLA

**Report of the
Economic Survey**

2011

**Prepared Under Direction of
Law Practice Management Committee**

American Intellectual Property Law Association
241 18th Street South, Suite 700
Arlington, Virginia 22202
www.aipla.org

| | Location | | | | | | | | | | | | | | |
|-----------------------|----------|----------------|-------------|---------------|------------------|------------|-------------------------|-------------------------|-----------------|----------------------------|------------------|---------------|--------------|--------------|---------------|
| | Total | Boston CMSA | NYC CMSA | Phila CMSA | Wash, DC CMSA | Other East | Metro South- east | Other South- east | Chicago CMSA | Minne- St. Paul PMSA | Other Central | Texas CMSA | L.A. CMSA | S.F. CMSA | Other West |
| Number of Respondents | 375 | 20 | 38 | 19 | 51 | 16 | 16 | 8 | 37 | 15 | 60 | 32 | 17 | 21 | 25 |
| Mean (Average) | \$2,769 | \$2,683 | \$3,200 | \$2,689 | \$3,242 | \$2,316 | \$2,648 | \$2,575 | \$3,528 | \$3,167 | \$1,790 | \$3,119 | \$2,632 | \$3,152 | \$2,017 |
| First Quartile 25% | \$1,300 | \$2,000 | \$1,675 | \$750 | \$1,600 | \$1,263 | \$1,100 | \$675 | \$2,500 | \$2,400 | \$750 | \$2,000 | \$1,375 | \$2,000 | \$575 |
| Median (Midpoint) | \$2,500 | \$2,500 | \$2,500 | \$2,000 | \$3,000 | \$1,750 | \$2,250 | \$1,500 | \$3,000 | \$2,500 | \$1,500 | \$2,800 | \$2,500 | \$3,500 | \$1,250 |
| Third Quartile 75% | \$4,000 | \$3,150 | \$5,000 | \$3,000 | \$4,500 | \$2,875 | \$3,875 | \$4,375 | \$4,000 | \$4,000 | \$2,500 | \$4,500 | \$3,650 | \$4,000 | \$2,750 |

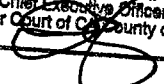
| | Location | | | | | | | | | | | | | | |
|-----------------------|----------|----------------|-------------|---------------|------------------|------------|-------------------------|-------------------------|-----------------|----------------------------|------------------|---------|--------------|--------------|---------------|
| | Total | Boston CMSA | NYC CMSA | Phila CMSA | Wash, DC CMSA | Other East | Metro South- east | Other South- east | Chicago CMSA | Minne- St. Paul PMSA | Other Central | Texas | L.A. CMSA | S.F. CMSA | Other West |
| Number of Respondents | 334 | 21 | 34 | 20 | 48 | 14 | 13 | 5 | 33 | 14 | 45 | 32 | 15 | 16 | 24 |
| Mean (Average) | \$3,553 | \$2,493 | \$3,906 | \$3,401 | \$4,920 | \$2,229 | \$2,719 | \$2,950 | \$4,000 | \$3,129 | \$2,445 | \$3,895 | \$3,800 | \$4,044 | \$3,500 |
| First Quartile 25% | \$1,500 | \$1,750 | \$1,475 | \$750 | \$2,500 | \$963 | \$1,000 | \$1,625 | \$2,125 | \$1,938 | \$750 | \$2,000 | \$800 | \$2,500 | \$850 |
| Median (Midpoint) | \$3,000 | \$2,000 | \$3,000 | \$3,000 | \$4,000 | \$1,600 | \$1,500 | \$2,500 | \$3,000 | \$2,900 | \$2,000 | \$3,600 | \$3,500 | \$4,500 | \$2,625 |
| Third Quartile 75% | \$5,000 | \$3,000 | \$5,000 | \$4,000 | \$6,000 | \$3,125 | \$4,000 | \$4,500 | \$5,000 | \$5,000 | \$3,750 | \$4,875 | \$5,500 | \$5,000 | \$5,750 |

| | Location | | | | | | | | | | | | | | |
|-----------------------|----------|----------------|-------------|---------------|-----------------|------------|-------------------------|-------------------------|-----------------|-----------------------------|------------------|---------|--------------|--------------|---------------|
| | Total | Boston CMSA | NYC CMSA | Phila CMSA | Wash DC CMSA | Other East | Metro South- east | Other South- east | Chicago CMSA | Minne.- St. Paul PMSA | Other Central | Texas | L.A. CMSA | S.F. CMSA | Other West |
| Number of Respondents | 340 | 21 | 37 | 20 | 48 | 14 | 13 | 5 | 33 | 15 | 47 | 32 | 15 | 14 | 26 |
| Mean (Average) | \$6,018 | \$5,082 | \$7,691 | \$5,788 | \$7,609 | \$4,089 | \$5,412 | \$4,050 | \$6,227 | \$5,713 | \$4,521 | \$5,990 | \$5,847 | \$6,471 | \$5,872 |
| First Quartile 25% | \$3,000 | \$3,050 | \$3,500 | \$1,050 | \$4,000 | \$1,875 | \$1,750 | \$2,625 | \$3,500 | \$4,000 | \$2,000 | \$3,000 | \$3,500 | \$4,150 | \$1,238 |
| Median (Midpoint) | \$5,000 | \$4,000 | \$5,500 | \$4,250 | \$6,000 | \$4,000 | \$5,000 | \$4,000 | \$5,000 | \$5,000 | \$4,000 | \$5,625 | \$5,500 | \$6,000 | \$4,000 |
| Third Quartile 75% | \$7,500 | \$5,500 | \$10,000 | \$6,375 | \$9,875 | \$5,625 | \$9,000 | \$5,500 | \$8,000 | \$7,000 | \$6,000 | \$7,500 | \$6,500 | \$7,625 | \$10,000 |

EXHIBIT 54

FILED

JUN - 6 2012

DAVID H. YAMASAKI
Chief Executive Officer/Clerk
Superior Court of California, County of Santa Clara
BY  DEPUTY

SUPERIOR COURT OF CALIFORNIA
COUNTY OF SANTA CLARA

LINEAR TECHNOLOGY,

Plaintiffs,

vs.

APPLIED MATERIALS, INC., et al

Defendants.

Case No. 1-02- CV-806004

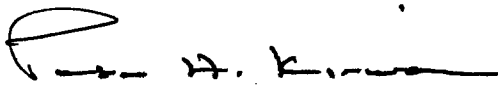
DEFENDANTS' MOTION TO FILE
UNDER SEAL AND FOR POST
JUDGMENT ATTORNEY FEES

Defendant Novellus System's Motion for Post-Judgment Attorney's Fees came on regularly for hearing on June 5, 2012 in Department 8 of the Superior Court, County of Santa Clara, the Honorable Peter H. Kirwan presiding. The matter having been submitted, the Court issues the following Order:

At the hearing, counsel for Plaintiff Linear Technology Corp. argued that a significant portion of the fees requested (approximately \$213,000) should be denied as they constituted post-judgment/pre-appeal attorney's fees which were time barred pursuant to the requirements of CRC 3.1702. Both parties referred to the case of Crespin v. Shewry (2004) 125 Cal. App. 4th 259. Crespin states that the timing requirements of CRC 3.1702 do not apply to motions seeking post-judgment/pre-appeal fees. The Crespin court held that such motions "could be made at any

1 time so long as it did not unfairly prejudice the party from whom fees were sought." In Crespín,
2 the court noted that the party opposing the motion for attorneys did not explain how it was
3 prejudiced nor did it proffer any evidence of prejudice. Here, it would appear that the plaintiff
4 was not prevented from challenging the fees incurred. Accordingly, the Court adopts its
5 tentative ruling in favor of Novellus and awards fees in the amount of \$523, 820.51 plus costs in
6 the sum of \$10, 236.93. The Motion to File Under Seal by Novellus Systems is GRANTED.

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12 DATED: 6/6/12


PETER H. KIRWAN
JUDGE OF THE SUPERIOR COURT

SUPERIOR COURT OF CALIFORNIA, COUNTY OF SANTA CLARA
191 N. First Street
San Jose, CA 95113-1090

(ENDORSED)
FILED

JUN - 7 2012

DAVID H. YAMASAKI
Chief Executive Officer/Clerk
Superior Court of CA County of Santa Clara
BY Ingrid Stewart DEPUTY

TO: Lisa Glasser
Irell & Manella LLP
840 Newport Center Drive Suite 400
Newport Beach, CA 92660

RE: Linear Technology -Vs- Applied Materials
Case Nbr: 1-02-CV-806004

PROOF OF SERVICE

DEFENDANTS' MOTION TO FILE UNDER SEAL AND FOR POST JUDGMENT ATTORNEY FEES

was delivered to the parties listed below in the above entitled case as set forth in the sworn declaration below.

Parties/Attorneys of Record:

CC: Steven A. Ellenberg , Steven A. Ellenberg Law Office
4 North Second Street, Suite 1240, San Jose, CA 95113-1308
Mark Daniel Rowland , Ropes & Gray LLP
1900 University Ave., 6th Floor, East Palo Alto, CA 94303
Allen J. Ruby , Skadden Arps Slate Meagher Et Al
525 University Avenue, Suite 1100, Palo Alto, CA 94301
Daniel J. Herling , Keller And Heckman, LLP
Three Embarcadero Center, Suite 450, San Francisco, CA 94111

If you, a party represented by you, or a witness to be called on behalf of that party need an accommodation under the American with Disabilities Act, please contact the Court Administrator's office at (408)882-2700, or use the Court's TDD line, (408)882-2690 or the Voice/TDD California Relay Service, (800)735-2922.

DECLARATION OF SERVICE BY MAIL: I declare that I served this notice by enclosing a true copy in a sealed envelope, addressed to each person whose name is shown above, and by depositing the envelope with postage fully prepaid, in the United States Mail at San Jose, CA on 06/07/12. DAVID H. YAMASAKI, Chief Executive Officer/Clerk by Ingrid C Stewart, Deputy